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Investigating the Pedagogical Content Knowledge of Outdoor Education Teachers.

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DECLARATION

I certify that this dissertation contains no material that has been accepted for the award of any other degree or diploma in any institute, college or university. In addition, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due reference is made in the text of the dissertation.

Christopher T Walker

Table of Contents

List of Tables, Figures, and Appendices

List of Tables

List of Figures

List of Appendices

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Abstract

Pedagogical content knowledge (PCK) is understood in contemporary literature as an essential component of the knowledge base required to deliver meaningful lessons and effective teaching. It is enacted through the blending of pedagogical and content knowledge (Shulman, 1987). Outdoor Education (OE) as a discipline is often undervalued as compared with mainstream subjects (Dyment & Potter, 2015). Recent OE literature has highlighted the signature pedagogies that are specific to OE (Thomas, 2015) and the bodies of content knowledge that Outdoor educators draw upon (Martin, 2008). PCK is a well-researched knowledge in other subjects, however there is little evidence of PCK research in OE. This research seeks to fill that gap through examining the PCK of Outdoor Education teachers as another element of quality teaching and learning in this subject. The overarching aim was to draw evidence of PCK from OE teachers' discussion and to inquire the effectiveness of the PCK Framework to determine suitable additions for the Framework. Contemporary educational and OE literature is blended throughout and examines PCK and the bodies of knowledge and significant pedagogies that OE offers.

This research project included the interview of seven participants. The results and discussion is presented over two chapters and is integrated with the data analysis and literature. The results are presented in the PCK Framework Sections 1) Clearly PCK, 2) Content Knowledge in a Pedagogical Context, and 3) Pedagogical Knowledge in a Content Context. A majority of participants showed their capacity to draw knowledge from differing PCK categories (e.g. Curriculum Knowledge and Student Thinking) as a part of the teaching process. This research found that the following categories should be added to the PCK Framework for future research; 1) Knowledge of Place, 2) Facilitation Techniques, and 3) Group Management Techniques. This

research contributes to OE through deciphering degrees of quality in teaching and learning and through contributing to the conversation of PCK research in OE.

Keywords: *pedagogical content knowledge, outdoor education, quality teaching and learning.*

Chapter 1 - Introduction

Chapter Overview

Before records began, humans have been connecting with the outdoors in traditional and inspiring ways. From Inuit living in Arctic conditions to Australian Aboriginals building bark canoes from trees, connecting with the outdoor landscape has been part of our lifestyle as humans. Outdoor Education (OE) developed as a discipline (Dyment & Potter, 2015) that is concerned with holistically developing students, mostly, through outdoor experiences (Wattchow & Brown, 2011). The focus of quality outdoor leadership is highlighted in the literature (Graham, 1997; Martin, Cashel, Wagstaff, & Breunig, 2006; Priest & Gass, 2005; Smith & Penney, 2010; Thomas, 2010), however there is little written on the quality of teaching and learning in OE. There is literature that focuses on the content knowledge (Bucknell & Mannion, 2006; Martin, 2008) and pedagogies (Blenkinsop, Telford, & Morse, 2016; Thomas, 2015) of OE, however there is little evidence focusing on the pedagogical content knowledge (PCK) (Shulman, 1987) of OE. PCK can be understood as the distinctive blending of knowledge areas (content knowledge and pedagogical knowledge) and the way that a teacher presents and adapts this knowledge into suitable ways to teach their students (Shulman, 1987, p 8).

This research seeks to understand the contribution that PCK research can have for OE. PCK research has been well-researched in other disciplines (e.g. Mathematics (Baker and Chick, 2006) and Science Veal, & MaKinster, 1999)). The importance of this research in relation to quality teaching and learning in OE is discussed, focusing on what contribution that PCK has for OE. A general introduction to quality teaching and learning is provided, focusing on PCK. An emphasis on the content knowledge and pedagogical knowledge that is found in OE is then presented. This

chapter will present the purpose of this research, the research questions and the significance of the research for OE.

Research Aims and Purpose

This research aims to inquire what PCK research can contribute to the OE research field, through examining teachers' discussion about how they teach the TASC (Office of Tasmanian Assessment, Standards & Certification) Outdoor Leadership Course. This will include a discussion on how useful and appropriate an amended PCK framework is for analysing is to OE teachers' PCK, based on Baker and Chick's (2006) PCK Framework. Specifically, this research will be guided by the following research questions:

1. What aspects of PCK are evident in OE teachers' discussion of their practice, as they seek to deliver the five topics of the TASC/TQA Outdoor Leadership Curriculum?

2. What aspects of the amended PCK framework are useful for analysing OE teachers' PCK and what adjustments of this framework can be made that will be effective for future PCK research in OE?

Significance of Research

OE is discussed as a field that stands to become more sophisticated in terms of explicit use of teaching, pedagogies, learning theories and assessment frameworks (Dyment & Potter, 2015, p. 148). Therefore, an intention of this project is to produce a baseline research platform for an on-going study of PCK in OE. A teacher's PCK is shown to be the largest contribution towards student outcome, (ahead of quality of instruction, classroom management, classroom climate, teacher beliefs, and professional behaviours) (Coe, Aloisi, Higgins, & Major, 2014) and researching this knowledge would aim to add educational value to the OE field.

This project is significant for a number of reasons as it stands to influence theory, practice and methods. Significant OE literature by Dyment and Potter (2015, p. 3) have identified that OE can be defined as a discipline, while clearly demonstrating that "outdoor education is undervalued and its benefits are not understood by most teachers, administrators, parents and policy makers." This insight from the literature shows that there is value in OE, however there is work to do in contributing to the conversation of quality teaching and learning in OE.

Likewise, Brookes (2004) highlights, in his critical review of OE curriculum and discourse, that "outdoor education exists, and there is work in explaining in and improving it." In so doing, he demonstrates that a practice with writing curriculum is "what to leave out." While these notions aren't specifically targeting PCK in OE, they are showing clear gaps in the knowledge base for OE as a disciplined field. These statements provoke thoughts and raise the question: how is this significant towards researching PCK in OE?

Great Teaching Review – PCK significance. Coe et al. (2014, p.2) presented a research review titled "What makes great teaching?" This review recognised PCK as having the strongest influence relating to "impact on student outcomes" in the classroom. It states that "the most effective teachers have deep knowledge of the subjects they teach, and when a teacher's knowledge falls below a certain level it is a significant impediment to students' learning" (p.2). Therefore to draw from this, it recognises that the intrinsic nature of PCK has impacts on the most centered stakeholders in education: the students. Thus, reflecting on the significance that this PCK research would have for OE, it is clear that this research stands to influence and benefit teachers, administrators and students in further developing their own knowledge and supporting students.

PCK Research in Related Educational Field: Why not in OE? The mainstream education fields of Physical Education (Marcon, Graça, & Nascimento, 2012), Mathematics

(Baker & Chick, 2006), Science (Loughran, Berry & Mulhall, 2012), and Drama (Pitfield, 2012) show clear research projects inquiring the PCK of teachers n these subjects. This evidence shows the significance of PCK research for these subjects. It then leads to the question of why is there little, if any, research for PCK in OE?

Upon review of the literature, there is limited relevant research that specifically focuses on researching OE teachers' PCK. There is, however, a related body of work that focuses on the "bodies of knowledge" in OE (Mannion & Bucknell, 2006), which will be further discussed in the Literature Review.

Interdisciplinary field. The nature of OE can be seen as an interdisciplinary subject that "trespasses through everybody's field" (Solnit, 2001, p. 8) as it draws themes and subjects from a variety of topics including, yet not limited to: sense of place (Aucoin, 2011; Brown, 2008) resilience and character building (Brookes, 2003a, 2003b), place-based education (Atencio, Tan, Ho, & Ching, 2014; Hutson, 2011), reflection and journaling (Hubball & West, 2008; O'Connell & Dyment, 2013; Timken & McNamee, 2012), and leadership (Kanengieter & Rajagopal-Durbin, 2012; Martin et al., 2006; Phipps & Phipps, 2003). These themes are representative of the body of knowledge that are presented in some OE curriculums (Stewart, 2003; TREK, 2015). The intent with identifying these themes is to show that while the OE field does have significant curriculum identified, there is still "work to do" (Brookes, 2004) in relation to sophistication of the field. Researching the PCK of OE would support the development of educational sophistication of OE and would contribute to OE research.

Dissertation Overview

This dissertation includes the following chapters: Introduction, Literature Review, Methodology, Results, Discussion, and Conclusion. The present chapter provided an introduction to the research by highlighting the research questions that will guide this study and by showing the significance of this research to the OE field, educational research and the gaps that this research is to focus on. The Literature Review reviews literature related to quality teaching and learning, PCK and the PCK framework, OE and related bodies of knowledge to provide a case for this research. The Methodology chapter focuses on the method that was employed to effectively collect the data and analyse results. The Results and Discussion chapters provides a structured analysis of the data and discusses the findings that support answering the research questions. The Conclusion chapter provides an overview of the research by discussing the key themes and findings, a future scope of research and concluding statements. Lastly, limitations of the research, the contribution of PCK to the field of OE, and future research pathways are discussed.

Chapter 2 - Literature Review

Chapter Overview

This chapter presents an overview of quality teaching and learning, followed by an in-depth analysis of pedagogical content knowledge and its impact upon education and related research. Models, definitions and insights are provided to present a review of PCK. Further, an overview of the disciplinary standing of OE is provided with an analysis of the bodies of knowledge and pedagogies offered by the field.

Quality Teaching and Learning

People from all walks of life can notice the longstanding effects of a quality teacher when they meet one (Boyes, 2004, p. 83). A quality teacher is the kind of teacher that cares deeply about their students, recognises the complexity in a modern classroom, communicates the content of their subject clearly in an engaging way, and consistently teaches innovatively (Stronge, 2007).

Effective quality teaching is the kind of teaching that leads students to success in the learning process, through their interaction with the teacher and a subject (Herring, Curran, Stone, Davidson, Ahrabi-Fard & Zhbanova, 2015). It is also the result of a combination of many factors including a teacher's background and ways of interacting with others, as well as specific teaching practices (Stronge, 2007). By way of example, the NSW Quality Teaching Model (NSW Department of Education and Training, 2008) highlights three dimensions of quality teaching (intellectual quality, quality learning environment, and significance of content and pedagogies to students) into a model that relates to the quality and interaction of students.

Much of the literature focuses on quality teaching and learning. Michael Strong (2011) presented a clear picture of quality teaching. He highlighted that research has categorised quality

teaching in relation to teacher qualifications (grades, quality of program), personal attributes (care for children, approachability, and friendliness), pedagogies practiced (use of classroom space, teaching methods, and grouping methods) and teacher effectiveness (success or failure of students). Strong's work on quality teaching and learning strongly relates to Shulman's (1987) categories of teacher knowledge, which include the distinctive areas that teachers draw knowledge from: this will be further discussed below. Although these categories do exist, Shulman (1987) introduced a way of looking at quality teaching and learning through the important connections among content, pedagogy and student. In 1987, he coined the term Pedagogical Content Knowledge.

Pedagogical Content Knowledge

Shulman, also known as the father of PCK, introduced the term PCK and has since become distinctive in teacher education, research, and policy making (Deng, 2007). The introduction of PCK was during an era of teaching reform and professionalisation with the release of "A Nation at Risk" (National Comission on Excellence in Education, 1983) in the United States of America. This drove a need to improve teaching globally. The argument for teacher reform came from the belief that a knowledge base existed that blended a teacher's knowledge, skills, understanding, and disposition (Bullough, 2001). It was related to the notion that teaching was about personal style, artful communication, knowing subject matter, and applying results from teacher effectiveness research (Shulman, 1987).

To go beyond this idealisation, Shulman noted that there were sources of teacher knowledge and also categories of different knowledge bases. He identified that teacher's knowledge can be presented as: (1) content knowledge, (2) general pedagogical knowledge, (3) curriculum knowledge, (4) pedagogical content knowledge, (5) knowledge of learners and their characteristics, (6) knowledge of education contexts, and (7) knowledge of educational ends,

purposes, and values (p.8). More specifically, this research will focus on (4) PCK which he defines as:

> the blending of content and pedagogy into an understanding of how particular topics, problems, or issues are organized, represented, and adapted to the diverse interests and abilities of learners, and presented for instruction. Pedagogical content knowledge is the category most likely to distinguish the understanding of the content specific from that of the pedagogue. (p.8)

He notes the nature of PCK as the kind of knowledge that takes a teacher,

> from being able to comprehend subject matter themselves, to becoming able to elucidate subject matter in new ways, reorganize and partition it, clothe it in activities, and emotions, in metaphors and exercises, and in examples and demonstrations, so that it can be grasped by students. (p. 13)

The essence of PCK is a teacher's capacity to turn their content knowledge into powerful lessons and teachings that suit the varied needs of students in their learning environments (Shulman, 1987). It is the form of knowledge that it is 'more than understanding the content itself' as it "bridge[s] the divide between content and pedagogy" (Ball, 2000). In the context of this research, content knowledge is the knowledge held by the content expert. By way of example, the in-depth knowledge that the mountaineer has about their most visited mountain is an example of content knowledge (Baxter & Lederman, 1999). General pedagogical knowledge refers to the broad principles and strategies of classroom management and organization that are used to teach subject matter (Shulman, 1987). Although the emphasis is on the synthesis of content, pedagogy and students, other authors have shown insights, models and definitions of PCK.

These authors have looked at a range of ways that PCK has been developed that goes beyond knowledge about content, pedagogy and students and that focuses on the development of internal and external factors that contribute to a teacher's PCK. Notably, the authors have focused on the epistemology of teachers and how other influences affect their teaching. By way of example how a professional development session plays out could influence a teacher's practice, thereby developing their PCK knowledge. Hashweh (2005) proposed the following definition:

> Pedagogical content knowledge is the set or repertoire of private and personal content specific general event-based as well as story-based pedagogical constructions that the experienced teacher has developed as a result of repeated planning and teaching of, and reflection on the teaching of, the most regularly taught topics. (p. 277)

This definition highlights the pockets of knowledge and the reflective aspect of teaching that builds a teacher's individual PCK. As compared with Shulman's (1987) initial definition of PCK, Hashweh's (2005) definition highlights how the experiences of a teacher's background influence their practice. It implies that only 'experienced' teachers have a strong PCK. In relation to inquiring about "What teachers do and how and why they do it?" this definition has seven entities that are drawn from the literature. These include (2005):

1. PCK represents personal and private knowledge.

2. PCK is a collection of basic units called teacher pedagogical constructions.

3. Teacher pedagogical constructions result mainly from planning, but also from the interactive and post-active phases of teaching.

4. Pedagogical constructions result from an inventive process that is influenced by the interaction of knowledge and beliefs from different categories.

5. Pedagogical constructions constitute both a generalized event-based and a story-based kind of memory.

6. Pedagogical constructions are topic specific.

7. Pedagogical constructions are (or ideally should be) labelled in multiple interesting ways that connect them to other categories and subcategories of teacher knowledge and beliefs.

This definition shows a way that PCK has developed in the literature. For the significance of this research, Hashweh's definition highlights the way that the different private and personal manifestations of PCK have been deciphered among the research participants. The external influences that contribute to the development of PCK have been written by Veal and MaKinster (1999), and Abd Rahman and Scarfie (2005). They have used models to visually represent the blending of categories and influences that help to develop a teacher's PCK. A teacher's PCK is generated from their personal development, experiences and surrounding colleagues.

As PCK is generated from a teacher's personal development and experiences, it has been found that there is no singular way to impart PCK to a teacher (Veal & MaKinster, 1999). Many models (Veal & MaKinster, 1999; Abd Rahman & Scarfie, 2005), theories and concepts have been developed to simplify this understanding and development.

Abd Rahman and Scarfie (2005, p.82) identified four elements of a teacher's PCK: 1. Subject Matter Knowledge (deep understanding and beliefs about the subject matter), 2. General Pedagogical Knowledge (teaching strategies, approaches, methods and techniques), 3. Knowledge

of Learners and Self (understanding of each student's history, learning styles, interests, strengths, learning goals, motivations, etc.), and 4. Knowledge of Curriculum and Context (knowledge of the curriculum, changes in curriculums and courses). As shown in Figure 1 below, the authors argue that these four elements combined conceptualises "a teacher's interpretations and alternations of subject matter knowledge for the purposes of facilitating student learning." (p. 82). The diagram also shows how each knowledge area interrelates and transcends the others to develop PCK in the center. This can be used as a way to understand the areas of knowledge that build teachers' PCK.

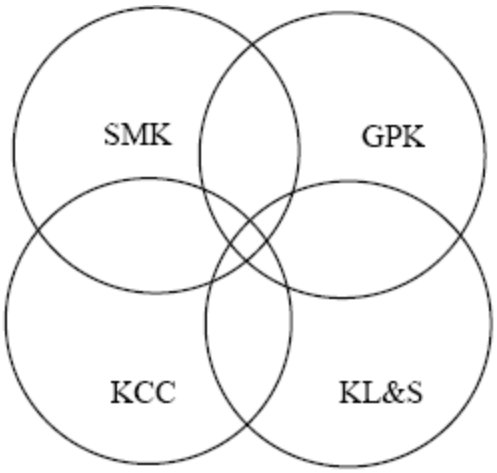

Figure 1 - Concept of Pedagogical Content Knowledge (Abd Rahman and Scarfie, 2005, p. 82)

"The Taxonomy of PCK Attributes" (Figure 2) as proposed by Veal and MaKinster (1999) shows a hierarchal representation to illustrate which experiences are more influential in the development of a teacher's PCK. The authors show that the first platform for the development of PCK arises from content knowledge, often from academic learning and experience with a subject. The next platform is knowledge of students and the in-depth ways of knowing how students learn

and interact. The following platform is eight attributes that build PCK. These include: context, environment, nature of subject (e.g. science and OE), assessment, pedagogy, curriculum, socio-culturalism, and classroom management (1999). The major point of difference with this PCK model, as opposed to Abd Rahman and Scarfie's model (2005), is the central placement of pedagogy knowledge embedded with other attributes, as opposed to pedagogical knowledge being placed alongside content knowledge (Veal & MaKinster, 1999).

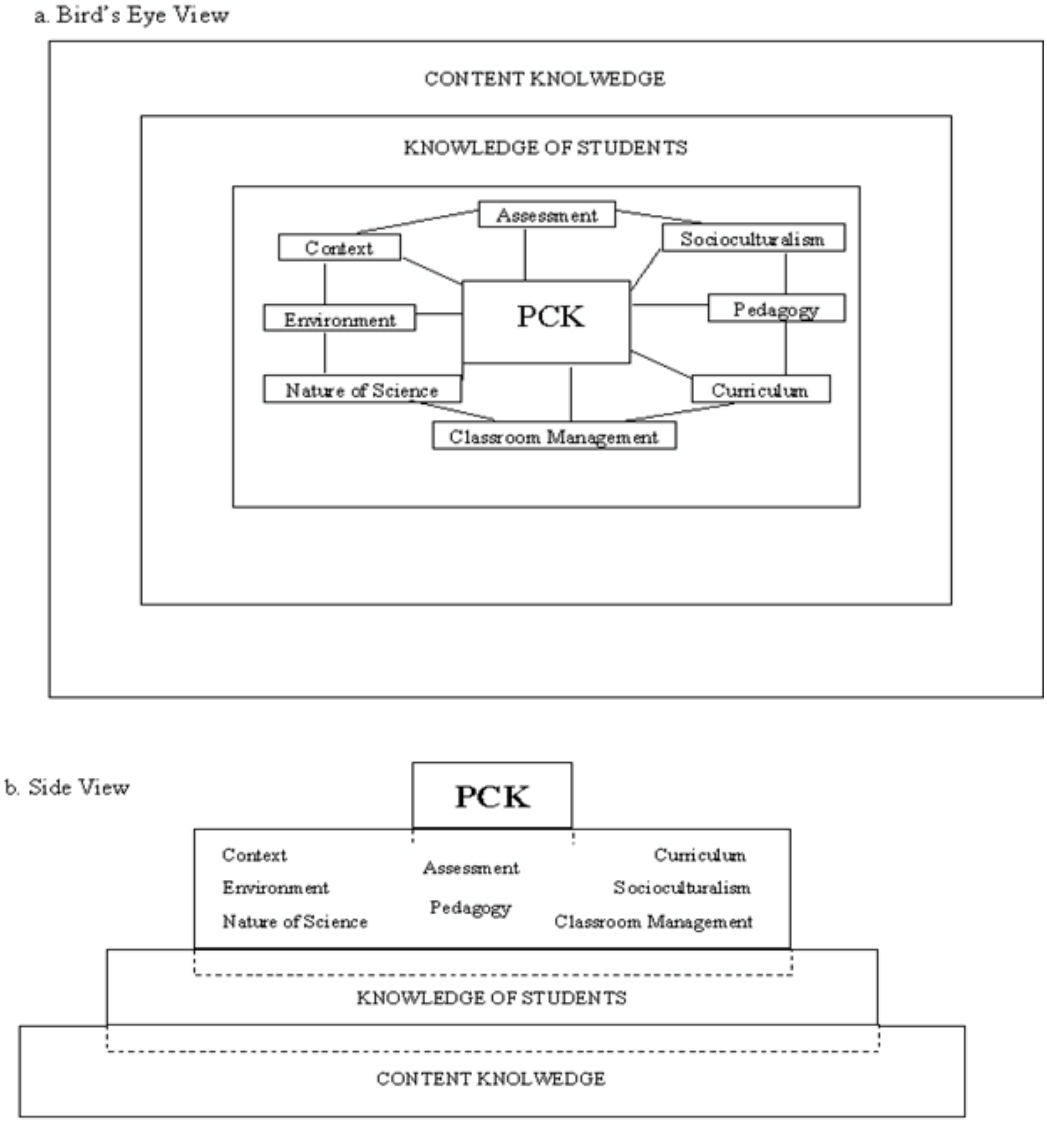

Figure 2 - The Taxonomy of PCK Attributes (Veal and MaKinster, 1999)

The authors note that the integration of "all ten attributes can occur in stages, cooperatively, or separately" (Veal & MaKinster, 1999). Using a local example, a teacher in Tasmania might be teaching about the "threats to wilderness areas and the potential impact on human-nature relationships" (curriculum knowledge) (Tasmanian Qualifications Authority, 2013) and use the story of the Franklin River (Green & Lea, 1981) as students may have parents that were involved first hand with the history (context & knowledge of students). Assessment can be prepared through story-telling and reflection of their own relationship with nature around a campfire on an overnight trip (assessment, nature of subject, environment, and pedagogy). In this example, attributes could have developed individually, as the 'development of PCK requires one to integrate different types of knowledge' (Veal & MaKinster, 1999).

These models are important to this research as they visually show the interrelations of different knowledge areas and how they build a teacher's PCK. Aspects and knowledge attributes of these models are embedded into the PCK Framework (Table 1) that has been used to analyse the data. By way of example, Curriculum knowledge is reflected in both the models and the PCK Framework (Table 1).

PCK Framework

While the above models represent the development of a teacher's PCK, Baker and Chick (2006) presented a framework of PCK that can be used to analyse a teacher's PCK. Taken from Mathematics research, their framework is categorised into three key elements of PCK. Firstly, "Clearly PCK" represents content and pedagogy interacting unconditionally and includes evidence of teaching strategies, student thinking, alternative models or representations, resources, and curriculum (2006, p.140). Secondly, "Content Knowledge in a Pedagogical Context" focuses on the content of a subject used for teaching which includes: the deconstruction of a topic to key

components, highlighting connections within topics and curriculums, and displaying a deep understanding of a topic (2006, p.140). Finally, "Pedagogical Knowledge in a Content Context" identifies generic teaching knowledge used in the specific content topic (2006, p.140). It therefore includes classroom management, maintaining student focus, and describing goals for learning (2006, p.140).

Table 1 below is an amended version of the PCK Framework developed by Baker and Chick (2006) that has been adjusted to analyse the PCK of the research participants. The adjustments that have been made were tailored to suit to the Outdoor Leadership Curriculum (Tasmanian Qualifications Authority, 2013). This includes a name change for certain topics and knowledge areas, by way of example when 2a changed from "Profound Understanding of the Fundamental mathematical curriculum" to "Profound Understanding of the Fundamental Outdoor Education curriculum." An aim of this research is to analyse the usefulness of this framework in an outdoor educational context and to understand PCK areas that this framework might be useful for.

Table 1 - PCK Framework for Outdoor Education

PCK Category	*Evident when the teacher …*
Clearly PCK	
1a Teaching Strategies	Discusses or uses general or specific strategies or approaches for teaching an Outdoor Education concept or skill
1b Student Thinking	Discusses or addresses student ways of thinking about a concept, or recognises typical levels of understanding
1c Student Thinking – Misconceptions	Discusses or addresses student misconceptions about a concept
1d Cognitive Demands of Task	Identifies aspects of the task that affect its complexity
1e Appropriate and Detailed Representations of Concepts	Describes or demonstrates ways to model or illustrate a concept (can include materials or diagrams)
1f Explanations	Explains a topic, concept or procedure
1g Knowledge of Examples	Uses an example that highlights a concept or procedure
1h Knowledge of Resources	Discusses/uses resources available to support teaching
1i Curriculum Knowledge	Discusses how topics fit into the curriculum
1j Purpose of Content Knowledge	Discusses reasons for content being included in the curriculum or how it might be used
1k Assessment Techniques	Discusses a range of assessment techniques that are for, of and as learning in relation to summative and formative assessment.
Content Knowledge in a Pedagogical Context	
2a Profound Understanding of Fundamental the Outdoor Education Curriculum	Exhibits deep and thorough conceptual understanding of identified aspects of the Outdoor Education Curriculum
2b Deconstructing Content to Key Components	Identifies critical outdoor education components within a concept that are fundamental for understanding and applying that concept
2c Outdoor Education Structure and Connections	Makes connections between concepts and topics, including interdependence of concepts
2d Procedural Knowledge	Displays skills for solving Outdoor Education/skill problem (conceptual understanding need not be evident)
2e Methods of Solution	Demonstrates a method for solving an Outdoor Education problem (i.e. Conflict Resolution or Judgement)

Pedagogical Knowledge in a Content Context	
3a Assessment Approaches	Discusses or designs tasks, activities or interactions that assess learning outcomes
3b Goals for Learning	Describes a goal for students' learning
3c Getting and Maintaining Student Focus	Discusses or uses strategies for engaging students
3d Classroom Techniques	Discusses or uses generic classroom practices

To understand how this framework could be useful for analysing OE teachers' PCK, the following is an insight to OE, the bodies of knowledge of OE, and pedagogies that are distinctive for OE. Although these areas of content knowledge and pedagogies exist separately as stated, there is little evidence of PCK as a separate researched entity in OE literature. This research aims to fulfil the gap and discover what PCK research in OE can contribute to the field.

Outdoor Education

Outdoor Education (OE) is a "subject that connects students to outdoor environments through experiences that contribute to the development of the student" (Wattchow & Brown, 2011, p. xvii). It is a subject that has topic areas related to environmental education, biology, experiential education and philosophy. Although it is a subject that does not have the deep curriculum history of mainstream subjects (e.g. mathematics and science), it is a subject that has moved beyond its "infancy" stages (Wattchow & Brown, 2011) and has the platform to be considered a discipline (Dyment & Potter, 2015). It is a subject that has critical research where the bodies of knowledge (Bucknell & Mannion, 2006; Martin, 2008), understanding of quality OE teaching (Boyes, 2004), and the specific pedagogies have been identified (Blenkinsop et al., 2016; Thomas, 2015). Although there is a substantial body of OE research, as Brookes (2004) stated "Outdoor education exists and there is work to do in improving it."

Upon review of the literature, there is little evidence of PCK research in OE. Therefore, as stated, this thesis aims to uncover evidence of PCK in OE and how it can contribute to further OE research. This section of the literature review will focus on what authors have shown about OE knowledge and pedagogies, therefore making space and drawing connections between PCK research and OE literature.

What is Quality Teaching in Outdoor Education?

A quality teacher in outdoor education has a certain way of connecting their students through a sensory experience in the outdoors. A way of telling stories of the land around a campfire, facilitating the quieter moments when paddling on a lake or the simplicity of allowing those most lived and memorable moments to happen, when students feel the most alive in a present moment (McMartin, 2007). These teachable moments (and teachers) are developed through the building of a teacher's knowledge and capacity to deliver quality lessons to a diverse student population. Boyes' (2004) paper about the maintenance of quality in preparing OE teachers, has similarities to a representation of PCK in OE. Notably, his writing focuses on content (subject matter), context (curriculum knowledge and student needs), and pedagogical knowledge as separate entities that construct teacher knowledge. He identifies the corresponding aspects of PCK to his arguments, but does not clearly discuss PCK. More so, his writing focuses on the importance of how research and practice need to inform each other to continue maintaining quality in teacher education.

Throughout the literature, there is a substantial body of literature focusing on what makes a quality outdoor leader (Graham, 1997; Martin et al., 2006; Priest & Gass, 2005; Smith, 2011; Smith & Penney, 2010; Thomas, 2010; Wilson, 2015). Throughout their teaching it is often found that teachers play a different role as either teacher, facilitator or leader; dependent upon the situation (Thomas, 2010). Although this thesis focuses on teaching, it is relevant to draw on

literature focusing on quality leadership, as teaching and leadership are related. Notably, Smith and Penney (2010, p. 27) identify that extraordinary leadership can be seen as the combination of leaders being "highly skilled in the areas of expertise required to lead in the outdoors (as reflected in core competencies) and in their ability to draw upon situational and conditional theories of leadership." Although this research is based on leadership, how it relates to PCK is through focusing on the blending of contemporary skills and leadership theories that both quality teachers and leaders have. As PCK is the blending of content and pedagogy, this notion presented is the blending of skills (e.g. content, climbing skills, and understanding of climbing) and use of leadership theories (e.g. pedagogy and way of leading) to deliver extraordinary outdoor experiences.

Content Knowledge Bodies in Outdoor Education

Martin (2008) presented core bodies of knowledge that are related to Outdoor Educational secondary schooling courses (including Outdoor Leadership and Adventure Education), in Australia. He presented six core bodies of knowledge that included: 1) Knowledge of outdoor pursuits (skill, practice, planning, or safety to participate in an outdoor activity); 2) Journeys or expeditions (the personal skills and knowledge required to participate in self-reliant expeditions), 3) Outdoor leadership (theoretical understanding and techniques required to safely lead groups outdoors), 4) Place-based knowledge (specific knowledge of location of outdoor pursuit), 5) Environmental science (scientific knowledge of the environment – e.g. water cycle), and 6) Human/nature relationships (an understanding of the differing human/nature relationships, both current and historical).

These bodies of knowledge presented by Martin (2008) represent key core content knowledge areas that OE teachers have to teach outdoor educational related courses. These core

bodies of knowledge identify the areas of content knowledge that OE teachers possess that contributes to their PCK knowledge. To support these key content areas, Thomas (2015) presented the signature pedagogies related to OE, as found from his research.

Pedagogies in Outdoor Education; Signature and for Mainstream Subjects.

Signature pedagogies are specified pedagogies that represent key teaching principles to a specific subject. These pedagogies are individualistic as they are influenced by the nature and content of a subject (Thomas, 2015). Not surprisingly, practical fieldwork is seen as the core signature pedagogy of OE as it is the space that outdoor educators can engage students to link theory, knowledge, and practice learning in a "real" environment (Thomas, 2015). The key difference that sets OE practical fieldwork apart from other subjects is that during field work (e.g., environmental science) "students themselves are a key factor in, and focus of, the learning whilst outdoors" (p. 188). By way of example, students on a canoeing OE field-trip are involved in the learning of the skill, place, and history (amongst other lessons), whereas on an environmental science field-trip, often, it involves the collection of data to learn about a topic in class. Underlying this pedagogical approach are three related signature pedagogies that Thomas (2015) identified from his research. These include: a leaner-centred, experiential pedagogy, transitionary pedagogy: from participant to teacher, and a reflective pedagogy: turning experience into learning. These are described in the next paragraph.

A learner-centred, experiential pedagogy is the approach of having leaners as the central focus in fieldwork to allow for deep practical learning opportunities (Thomas, 2015). Whereas a transitionary pedagogy focuses on developing students' skills to transition from being a competent participant, through to becoming leaders/teachers in outdoor environments. Finally, a reflective pedagogy focuses on equipping students with the skills to critically reflect about experiences to

form analysed and specific lessons from an array of techniques (e.g. debriefing, journaling, or nature diaries) (Thomas, 2015). It is important to this research to highlight these pedagogies as they are related to the overall development of each participant's PCK; aspects of these pedagogies are evidently found in the results of this thesis.

OE researchers Blenkinsop et al. (2016) discovered five transferable pedagogies that can both illuminate the pedagogies of mainstream school subjects while remaining critical pedagogies for OE teachers. These pedagogies included managing rhythm, shape and structure (constantly adapting and flowing with changes in an unplanned lesson), lateral thinking (the intellectual flexibility to transcend a teachable moment/topic to cover cross-curriculum topics), risky learning (allowing an acceptable level of risk into the learning process and anticipating the unexpected), safety (understanding how to manage risks and the unexpected), and eco-reflection and evaluation (reflecting across all areas of teaching for and with students). The identification of these pedagogies by Thomas (2015) and Blenkinsop et al. (2016) shows the breadth of different and related pedagogies that OE teachers have developed and can offer to their students. It is imperative for this research to highlight these pedagogies as evidence of these are shown in the Findings and Discussion chapter (5) of this thesis.

These distinctions of content knowledge and pedagogical knowledge in OE are important to this research as they show the 'gap' in PCK research in OE. It is important to research specifically PCK in OE to identify where the research can go to further contribute to the OE field and the body of OE research. The Results and Discussion chapters will draw conclusions from the data and provide a way forward for this type of research.

Chapter Summary

This chapter identified key literature to provide a background to support the research aims and questions. An introduction to quality teaching and learning was identified and a critical review of PCK was presented. Following, an overview of the disciplinary standing of OE was presented with key and transferable pedagogies that OE can offer to mainstream subjects. The following chapter will focus on the methodology employed to answer the research questions.

Chapter 3 - Methodology

Chapter Overview

This chapter focuses on justifying and explaining the research design and methods used to answer the research questions. This research aims to find evidence of PCK from OE teachers, as they teach the TASC (Office of Tasmanian Assessment, Standards and Certification, previously the Tasmanian Qualifications Authority TQA. NB – At the time of writing, the course document was still titled with the TQA, therefore TQA remains as the reference.), Outdoor Leadership subject. The research was guided by the following questions:

1. What aspects of PCK are evident in OE teachers' discussion of their practice, as they seek to deliver the five (5) topics of the TASC/TQA Outdoor Leadership Curriculum?

2. What aspects of the amended PCK framework are useful for analysing OE teachers' PCK and what adjustments of this framework can be made that will be effective for future PCK research in OE?

Methodology

This research used a qualitative research approach, employing interviews and a case study approach. As expressed by Saldaña (2011, p. 4), qualitative research is "composed of essential representations and presentations of salient findings from the analytic synthesis of data." It is essentially a way to explore and further understand the meaning individuals or groups ascribe to a social or human problem (Creswell, 2014).

The nature of a case study is to develop an in-depth analysis of the study. In this research the case is individuals and the analysis is focusing on collecting detailed data using interviews (Creswell, 2014). The project aims to find evidence of quality teaching and learning of OE teachers

throughout Tasmania, therefore looking into the ways that these teachers are engaging and teaching students in this subject. To examine this, the research employs a structured process that is flexible and adaptive, to gather meaningful data.

Participant Selection

The nature of this qualitative research is to focus on the teaching of Outdoor Leadership (TQA, 2013) therefore, a small number of research participants were suitable. As specified by Creswell (2014), with qualitative research it is suitable to be purposefully selective with the research sample, as it helps the researcher to best answer the research question.

Collecting meaningful and diverse data required the volunteer support of OE teachers in Tasmania that were involved with the teaching of Outdoor Leadership (TQA, 2013). Approximately 30 individuals were suitable for the study, however, a small sample size was required to accurately fulfil the requirements of the research question. Participants were recruited through a variety of ways. Initially, a recruitment email was sent to the Outdoor Education Tasmanian (OET) email list (Appendix 1). A follow-up email was later sent prior to a Quality Assurance (QA) meeting (Appendix 2) and then participants were recruited at a QA meeting. Finally, invitational phone calls were made. Seven participants agreed to take part in the research, geographically representing different areas of the state. In the space of an Honours research project, seven participants were sufficient to collect meaningful data to answer the research question.

Method (Interview)

Interviews are a common data collection method for qualitative research, as they effectively elicit responses to help answer the research question (Creswell, 2014). The interview was designed for the participants to reflect, critically analyse and conceptually answer questions

about their teaching. It was useful to draw the participants' perspectives, opinions, attitudes, and beliefs of their personal experience and factual information about their teaching (Saldaña, 2011, p. 32). The interview schedule was semi-structured in nature, with funneling questions that utilised common scenario-based responses and open-ended questions about teaching and learning related to the course (Appendix 3). The data collected for this research was voice recorded with face-to-face and video conference interviews in a quiet space, and then later transcribed for data analysis.

The interview was designed to draw out certain aspects of teaching in relation to the PCK Framework for Outdoor Education (Table 1). By scheduling 'big-picture' and 'small-picture' questions, the interview aimed to draw broad conceptual responses about teaching and focus on specific aspects. By way of example, questions were asked about how topics within the curriculum were taught (big-picture) and how curriculum outcomes were assessed in relation to a scenario (small-picture). This method enabled a diversity in the data collected and produced differing results for the analysis.

A pilot run of the interview was conducted with a colleague, to allow for edits and reflection of the interview schedule. A notable change was the addition of a preamble to facilitate the participants feeling more comfortable with the interview, as the feedback was that the interview 'felt like a test'. The following is an overview and justification of each question from the interview.

Topic A: Planning for Outdoor Activities

QA1. Scenario: You have a new class of 15 students, all of which have varied outdoor experience, that are in Grade 11 for Outdoor Leadership. You're starting on a new topic in Term 1 which is Navigation (map and compass).

Q) How would you teach it?

- Tell me more about that.
- What resources would you use?
- Do you teach any other activities?

QA1 was drawn from Topic A which specifically focused on Navigation: map and compass skills. The design of the scenario and question aimed to draw PCK examples of Teaching Strategies (1a), Curriculum Knowledge (1i), Knowledge of Resources (1h), Explanations (1f), and Outdoor Education Structure and Connections (2c). This scenario was designed as an introduction to the interview, to give teachers the space to express their practice, and to show their knowledge about teaching this common skill base in OE. The prompting questions aimed to draw the specifics methods and resources they used for their lessons.

QA2. Scenario. You're taking the same class on a 6-day hike in the Walls of Jerusalem in Term 4, after teaching them map and compass in Term 1. Andrew is struggling with declination and is continuously making the common mistake of adding the declination (instead of subtracting), when going from map to land.

Q) What do you do to support him?

- And how do you know if he's got it?

QA2 followed QA1 and was drawn from the same lesson in the curriculum. It was designed to draw out knowledge of techniques to support a common student skill error. It aimed to draw PCK examples of Teaching Strategies (1a), Student Thinking (1b), Cognitive Demands of Task (1d), Procedural Knowledge (2d), Methods of Solution (2e), Assessment Techniques (3d), and

Goals for Learning (3b). More so, this question allowed the participants to reflect on their ways of supporting an individual student and the different ways to teach this lesson.

Topic B: Leadership Theory

QB1. Scenario: You have a class of 23 mixed gendered students in Grade 11 & 12. You're about to start teaching Situational Leadership Theory.

Q) How would you teach this subject?

- Could you elaborate further on this?

QB1 was designed from Topic B and focused on Situational Leadership Theory. This theory relates to the different styles of leadership that a leader would implement based on situations. It is similar to other leadership theories in the curriculum (e.g. Conditional Outdoor Leadership Theory) and this relation can influence the way it is taught. QB1 aimed to draw out PCK examples of Teaching Strategies (1a), Student Thinking (1b), Appropriate and Detailed Representation of Concepts (1e), Explanations (1f), Knowledge of Examples (1g), Knowledge of Resources (1h), Curriculum Knowledge (1i), and Outdoor Education Structure and Connections (2c). This question was open ended, allowed the participants to share a variety of ways that they taught this topic, and also allowed them to show knowledge of the curriculum.

QB2. Scenario: You are on the final day of an eight day bushwalk on the South Coast Track with a group of ten male Year 12 students. One of the requirements for the trip is for students to engage in deep critical thinking about the trip, their own thought processes, and understand the ways that reflection can play a role in their own learning.

You read over the students' journals and notice that they're simply writing about the food they're eating and where they have been; there is little evidence of deeper level engagement.

Q) What teaching strategies would you use to facilitate deeper reflection?

- Please elaborate on that strategy

- What other outdoor teaching strategies would you use?

QB2 focused on "Techniques for reflecting on outdoor adventure activities." The scenario was designed in a wilderness location on a challenging trail with a demographic that can be assumed as a non-creative and less-reflective. The assumption that can be made with this demographic is aimed to draw out the knowledge of students and challenge the participants' perception of students. This scenario aimed to draw out PCK examples of Teaching Strategies (1a), Student Thinking (1b), Knowledge of Examples (1g), Knowledge of Resources (1h), Deconstructing Content to Key Components (2b), Procedural Knowledge (2d), Methods of Solution (2e), Assessment Approaches (3a), Goals for Learning (3b), and Assessment Techniques (3d). The key aspect of this question aimed to allow participants to show their deeper knowledge of reflective practices that would effectively engage students in their own reflection.

Topic C: Group Management

QC1. Q) How would you teach about the role of effective communication in group management to students?

- What other strategies would you use?

QC1 focused on communication. This open-ended question was intended to draw knowledge from all PCK categories to diversify the responses. The open-ended nature of this

question aimed for participants to answer broadly about their teaching and show different strengths in their PCK knowledge. By way of example, it allowed for participants to discuss their knowledge of students or focus on teaching strategies, while still expressing their content knowledge.

QC2. Scenario. You're co-leading a group of eight mixed–gendered Grade 12 students on a sea kayaking trip in Frecycinet National Park. You've hired a local guide and the agreement was that, as the teacher, you're in-charge of behaviour management. All the students are in double sea kayaks.

Allyson is in the bow (front) of a kayak with Thomas and he is continually splashing water at another boat with his paddle. Jenette is becoming frustrated with Thomas and is yelling from her boat she wants to go to shore and go home because of Thomas.

Q) How would you engage with this group to teach them about how to deal with this conflict and conflict resolution strategies?

- Could you please elaborate?

QB2 focused on strategies to resolve a conflict between two students in a wilderness setting. The question aimed at drawing knowledge of how the teachers would engage with students during a conflict and create learning opportunities. This question also aimed to show PCK examples of Teaching Strategies (1a), Student Thinking (1b), Purpose of Content Knowledge (1j), Deconstructing Content to Key Components (2b), Procedural Knowledge (2d), Methods of Solution (2e), Goals for Learning (3b), Getting and Maintaining Student Focus (3c), and Classroom Techniques (3d). The key aspect of this question and scenario was for teachers to show their knowledge of how they would engage with certain students and support them during a conflict.

Topic D: Ecological Sustainability in Outdoor Adventure Activities

QD1. Q) How would you teach and encourage the seven principles of Leave No Trace as an educational concept within wilderness travel?

QD1 broadly focused on the delivery of the Leave No Trace (LNT) Principles. The LNT principles are a set of practices that encourage minimal impact while traveling in natural environments. This is an open-ended question seeking a broad response where participants were able to express their areas of PCK strength, as it aimed to draw PCK examples from all knowledge areas. The intent and layout was similar to QC1. The uniqueness of this question was that it allowed teachers to discuss the different methods and locations that would teach these principles throughout the course.

QD2. Scenario: You are on a rafting trip down the Franklin River with a class of Year 11 students. This is Sarah's first outdoor trip and you find her washing pots that are covered in food in a slow moving creek, near the river.

Q) How would you facilitate her thinking process about this practice?

- Could you please elaborate?
- Why, specifically, do you engage in this way?

QD2 follows the LNT lesson from QD1. This scenario and question was designed to draw knowledge from the participants about how they would support students in a one-to-one setting. The question aimed to provide PCK examples of Teaching Strategies (1a), Student Thinking (1b), Cognitive Demands of Task (1d), Explanations (1f), Purpose of Content Knowledge (1j), Outdoor Leadership Structure and Connections (2c), Procedural Knowledge (2d), Methods of Solution (2e),

and Goals for Learning (3b). The question was designed to draw knowledge about how to support a student with a common error and understand the student's thinking process.

Topic E: Human-Nature Relationships

QE1. Your class is learning about "Sense of place and space" and how it can relate to their own relationship with nature.

Q) How would you know if your students understand this?

QE1 is drawn from Topic E (Human-Nature Relationships), which is a topic that focuses on contemporary and historical human-nature relationships. This question was designed to allow the participants to reflect on the teaching strategies and ways that they could support students to understand their own relationship with nature. The question aimed to draw PCK examples of Teaching Strategies (1a), Student Thinking (1b), Student Thinking – Misconceptions (1c), Cognitive Demands of Task (1d), Knowledge of Examples (1g), Assessment Techniques (1k), Outdoor Education Structure and Connections (2c), Procedural Knowledge (2d), Methods of Solution (2e), Assessment Approaches (3a), and Goals for Learning (3b). This was an open-ended question aimed to draw broad responses from participants about how they would support students' understandings of their own relationship with the natural environment. It focused on a complex topic and would draw deeper knowledge and a sense of passion from the participants about creating those relationships.

QE2A&B. Scenario: Last year, you brought the current Year 12 class to Mount Field National Park on a day hike, in autumn during the "turning of the Fagus" – the students were mesmerized by the aesthetic beauty of the place! This year, you've brought the students back to the same place in July. Snow has just dumped across Tasmania the previous day and Mount Field

is covered and is still safely accessible. Most of the students are playing in the snow, throwing snowballs and building snowmen. Yet, you notice a particular trance in Tracey's emotive state as she is on her own…just standing there. She hasn't been upset by peers, but is obviously in a deep reflective state about her experience in this place.

QE2A. Q) How do you facilitate the group through the varied experiences they've had?

QE2A focused on the varied emotional experiences that students were having upon returning to a place that has changed seasons. The question aims to draw knowledge of how participants would support the various experiences students were having. It particularly focused on drawing PCK examples of Teaching Strategies (1a), Student Thinking (1b), Appropriate and Detailed Representations of Concepts (1e), Deconstructing Content to Key Components (2b), Procedural Knowledge (2d), Methods of Solution (2e), and Goals for Learning (3b). This question aimed to allow participants to deeply reflect on various facilitation and differentiation techniques that they could use to support students.

QE2B. Q) Each student in this scenario has experienced differently. How do you facilitate the students' learning to align their experience with the curriculum outcomes of this topic?

QE2B followed QE2A to focus on drawing connections from field experiences to align with curriculum outcomes. It was a question designed to draw deep curriculum knowledge and focus on assessment strategies related to an emotional experience. Primarily, this question aimed to draw PCK examples of Teaching Strategies (1a), Student Thinking (1b), Appropriate and Detailed Representations of Concepts (1e), Explanations (1f), Assessment Techniques (1k), Profound Understanding of Fundamental Outdoor Education Curriculum (2a), and Deconstructing

Content to Key Components (2b). The overarching aims of this question were to diversify the interview and to draw knowledge related to the curriculum and connections within it.

Data Analysis

Data analysis is the process of making meaning of the data. It involves consolidating, reducing, and interpreting data to produce themes and codes that help to answer the research question(s) (Merriam, 2009). The process of analysis of this research followed a linear process of organizing the data, hand-coding the data into themes/categories and interpreting the data to produce results (Creswell, 2014). Primarily, the process included the transcription of the audio-recorded and the accuracy of these transcripts were double checked by the researcher. The data was later prepared for coding.

The data analysis processes involved repeatedly reading and consolidating the data to be coded into a 'qualitative codebook.' A qualitative codebook is identified by Creswell (2014) as a table that contains a list of pre-determined codes that researchers use for coding data. The codebook that was used for this research is the PCK Framework for Outdoor Education (Table 1). The data was then interpreted to produce the findings that are discussed in later chapters.

The validity of this research was ensured using validity strategy to warrant the trustworthiness, authenticity, and credibility of the results (Creswell, 2014, p. 201). A 'peer debriefing' strategy has been used as a way to ensure the accuracy of the findings. It is the process of using an external person who reviews and asks questions about the study to ensure accuracy and validity (p. 201). This allowed for external critical opinions to be offered to the findings.

Ethical Considerations

In order to collect data for this research, ethics approval was given by the Human Research Ethics Committee (HREC) at the University; approval number H15108 (Appendix 4). The data was then collected following this approval.

The identity of the participants has been protected and their names have been replaced by pseudonyms for publications, which is a common practice among qualitative researchers to respect the identity of participants (Creswell, 2014). The geographical location of the participants (Tasmania) has been identified, as the curriculum for this research was based in Tasmania.

All data, including transcripts and audio recordings, have only been accessed by the primary researcher and supervisors. The data has been stored on a password protected computer and will be held for a minimum of five years before being permanently deleted from all mediums. All hard copies of transcripts will be shredded, after submitting the final draft.

Chapter Summary

This chapter discussed the qualitative and case study methodology that was used for the research. This chapter has summarised the methods for participant selection, data collection, data analysis, and ethical consideration that support answering the research questions. The following chapter, Results, presents the results from the analysis and discuss how these results relate to current PCK Framework for Outdoor Education (Table 1).

Chapter 4 - Results

Chapter Overview

The following results show evidence of each PCK categories' knowledge base (e.g. 1a-Teaching Strategies) from the data. The results are drawn from the seven semi-structured interview transcripts where responses were received in relation to the teaching and learning of the TASC/TQA Outdoor Leadership Curriculum (TQA, 2013). Each knowledge category contains: number of teachers that provided evidence, topics related to the knowledge, categories of the knowledge, an example of the knowledge and the type, quality of knowledge presented, and the question from the interview transcript identified (e.g. QA1) (Appendix 3). In relation to specific questions, question codes have been used as a reference to Appendix 3 (interview schedule) and are written as QB1, whereby Q is question, B is the curriculum topic (e.g. B- Leadership Theory) and 1 is the question number.

Clearly PCK

1a. Teaching Strategies - Discusses or uses general or specific strategies or approaches for teaching an Outdoor Education concept or skill. As teachers described their teaching of Outdoor Education, all participants were able to provide a wide range of teaching strategies that they used to facilitate student learning. There were 58 examples of these teaching strategies, which were placed into three categories. The responses came from nine questions (QA1, QA2, QB1, QB2, QC1, QD1, QE1, QE2a, and Q2Eb) of which teachers' responses were both prompted and unprompted about topics, concepts and skills. The strategies discussed ranged from in-class pre-testing to deep critical reflection strategies.

The teaching strategies identified were categorised into classroom teaching, discussion-based, and field (out-of-class) strategies. Some examples of each category include: classroom

teaching, short-answer worksheets, modelling behaviours, research assignments, and PowerPoint presentations. Discussion based strategies included guided reflections, identifying learning in focus for the day, and group discussions. Field strategies included solo reflective time, outsourcing field work to businesses, and using practical learning experiences to teach. By way of example, Gilbert stated "I try to refocus on those technical map and compass skills, on say an overnight experience, or a day trip experience of some sort where they can actually use the skill and test out what they know out in the field."

1b. Student Thinking - Discusses or addresses student ways of thinking about a concept, or recognises typical levels of understanding. Throughout the interviews, five teachers showed evidence of having knowledge of student thinking, including the ways that students think about concepts, relate to the outdoors and the diversity of their students. The teachers, mostly unprompted, discussed the ways that students think in 11 scenarios with 18 examples. The examples mostly came from discussion about map and compass (QA1), reflection (QB2) and LNT (QD2). The teachers discussed a wide-range of categories relating to students' thinking, notably each teacher was differentiating to their class. The categories discussed showed understanding of supporting the learning needs of students, their prior knowledge and experience, class and group dynamics, relating concepts to their lives, and practical learning experiences (Thomas, 2015).

In their discussion, the teachers presented an in-depth understanding of how their teaching practices were influenced by student thinking. There was also clear evidence of teachers adjusting their teaching practices following their knowledge of students. By way of example, when Maddy was discussing Year 11 students enrolling in Outdoor Leadership, unprompted, she stated that:

> We don't feel that at Year 11 they're at a stage that they can actually lead. And have the confidence to do that. And there is anecdotal evidence from the students' feedback that's the case as well, and the Year 11's tend to struggle a lot.

1c. Student Thinking (Misconceptions) - Discusses or addresses student misconceptions about a concept. Throughout the interviews, two teachers showed evidence of knowing about students' misconceptions and misunderstandings about concepts and topics. In the two scenarios, map and compass (QA1) and student thinking of LNT (QD2), there were three examples of this knowledge shown. The teachers discussed their thoughts of the students' prior experience with a topic. The teachers discussed students' misconceptions of the relation of topics within the curriculum, identifying mistakes with procedures and would assume knowledge (or lack thereof) about topics.

This knowledge area wasn't heavily discussed as teachers would more often discuss what the students knew and adapt their teaching accordingly. By way of example, when asked QA1 Cooper stated "I would, for a year 11 class, probably assume that they don't have a lot of knowledge. They probably have come with some knowledge and there'll be some students who have got lots of knowledge." Contextually, here Cooper discusses the range of knowledge that students bring to the classroom, thereby he stated how it affects his future planning of the course.

1d. Cognitive Demands of Task - Identifies aspects of the task that affect its complexity. Throughout their discussion, four teachers identified aspects of a task/concept that affect its complexity across four different scenarios. The responses mostly came from discussion about map and compass (QA1), where teachers provided five examples of this kind of knowledge. All the responses were unprompted. The topics discussed related to navigation, sense of place,

communication, and group dynamics. Within these topics, teachers identified the physical connections to theories, observational skills for relational understanding, identified the challenges to effective communication in outdoor environments (e.g. noise of rapids on a river), and showed how meeting the needs of students (TQA, 2013) affects student engagement.

Some topics within the Outdoor Leadership curriculum are both theoretical (e.g. leadership theories) and factual practical applications (e.g. LNT Principles). By way of example, there is a range of procedures for teaching map and compass skills (e.g. declination and taking a bearing), whereas sense of place and space is an emotional, spiritual, and personal connection to a place that is expressed through Peter Martin's (2004) signposts to nature. From the data shown, Maddy highlighted a connection with sense of place and space by stating:

> It is not until they have actually spent time in a place that they can have a notion of what is meant by a sense of place and space. And so that idea of a relationship with place likening it first to a relationship with a person, and so any relationship has to be reciprocal in that. And there is a give and take and there's a familiarity.

This example shows that teachers have the capacity to identify the complexities of concepts.

1e. Appropriate and Detailed Representations of Concepts - Describes or demonstrates ways to model or illustrate a concept (can include materials or diagrams). Four teachers showed knowledge of a range of representations of concepts that are used for their students. Six examples were identified from four separate scenarios, with most of the discussion relating to sense of place and space (QE1A&B). Teachers were prompted about topics and discussion points. Their discussion provided appropriate and detail representations of concepts.

The teachers mostly used representations that were related to students' lives to help deeper the understanding of topics. The teachers would use diagrams (1), detailed maps (1), concept maps (1), initiatives (1), metaphors (1), and visuals (1) to represent concepts. By way of example, when Jarrell was discussing how he would teach Situational Leadership theory, he stated:

> I've found this one works really well with lots of diagrams, there are some good diagrams in our texts that we use, so getting those up on the board, constructing that diagram with the kids, explaining it, and then generally relating some practical scenarios to, to apply to that diagram, so that the kids then understand.

1f. Explanations - Explains a topic, concept, or procedure. Throughout their discussion, four teachers gave explanations of a topic, concept, or procedure. There were five examples in two scenarios, mostly in response to QC1 about the role of effective communication in group management. Two teachers explained the barriers to communication, when prompted, about their reaction to a sea kayaking scenario. The other responses provided examples about concepts. The topics that teachers explained were related to student suitability to the course (1), role of effective communication in conflict resolution (2), Situational Leadership (1), and LNT (1).

Notably, Gilbert upon explaining leadership theories stated:

> I was going to talk about how there's different ways that you as a leader can respond to that situation and you could get very autocratic and start moving people around and do that, or you could encourage a more positive response and get the students to take more ownership of what they're doing for the group.

1g. Knowledge of Examples - Uses an example that highlights a concept or procedure. Six teachers provided a breadth of examples to highlight concepts in their teaching. There were 18 responses from seven scenarios that provided strong evidence of example use. Most of the examples were in response to QB2, about reflection. There was a wide range of examples expressed, mostly related to using local contexts (7) (common Tasmanian locations, e.g. Mount Wellington), relational examples (6) (using students' own relationship with nature as examples), practical examples (3), historical (2) (about Shackleton from Hamish), humorous scenarios (1) (Gilbert), digital resources (1) (Geoff), and peer work (1) (Hamish).

The responses were explicit and well thought out. They each provided a strong teaching example of a concept. By way of example, when Kyle was talking about different values that humans have for places, he stated:

> With Mount Wellington, we watched the video on Mount Wellington. It's all about its history and talks about different uses from Aboriginal use through to all the little huts and hotels. And then go out there and talk about the future as well, with the cable car and stuff like that. So that's a really good example, because there is that future look.

It is clear from this example, that teachers have a strong 'bank' of examples of local knowledge that they use to aid their teaching.

1h. Knowledge of Resources – Discuses/uses resources available to support teaching. In answer to what resources were used to support teaching map and compass, six teachers showed knowledge of diverse resources that are used to aid their teaching. There were seven examples of resources discussed, five of which were suggested after questions (Q1A - What resources would you use?) and two were unprompted. The responses mostly came from one scenario (QA1),

however one participant, unprompted, showed this kind of knowledge when discussing reflective journals (QB2). The resources described showed that the teachers used a diverse range of new (e.g. Interactive Whiteboard) and "classic" (e.g. map and compass) types of resources to aid their teaching.

The resources identified included school equipment (e.g. map and compass and GPS), external organizations (Orienteering Tasmania), new technologies, and environmental resources (using sand to build maps outdoors). Most resources mentioned were physical objects, however there was also mention of external human resources (Orienteering Tasmania). The resources identified were campus maps (3), topographical maps (2), GPS devices (2), compasses and maps (2), the textbook (1), interactive whiteboards (1), picture cards (1), local bushland areas (1), Orienteering Tasmania (2), map-reading handbook (1), and sand (1). By way of example, Geoff stated "I would use aerial pictures from various different mapping online and offline facilities, topographic maps, local bushland areas, school campus. Sometimes we access the orienteering club up here."

1i. Curriculum Knowledge - Discusses how topics fit into the curriculum. Five teachers showed clear evidence of curriculum knowledge across five scenarios. The main body of responses came from discussion about map and compass (QA1) as teachers discussed the amount that map and compass taught in the curriculum. The breadth of their knowledge mostly related to where topics fit within the curriculum (Kyle and Maddy) (3), evidence of curriculum knowledge (Geoff & Maddy), (2) assessed curriculum outcomes (2), and the history of the curriculum (1) (Gilbert).

Their responses were diverse as they mentioned the scope of topics within the curriculum and provided an analysis of how these topics fit within the curriculum. Notably, Gilbert mentioned

their personal history with the curriculum and how the curriculum has changed due to external factors (The Department of Education Tasmania) and government opinions. This evidence shows that these teachers have an understanding of the curriculum beyond the topics and outcomes, whereby they are involved in the writing, assessment, and development of the curriculum.

1j. Purpose of Content Knowledge - Discusses reasons for content being included in the curriculum or how it might be used. In their discussions, two teachers each gave one piece of evidence of why specific content topics were in the curriculum and how the participants would use the content. The two scenarios discussed related to Situational Leadership theory (QB1) and student thinking in relation to LNT (QD2). Without being prompted, one teacher focused on how a topic fits into the curriculum and the other discussed the importance of the topic in the subject.

Both expressed little evidence of this kind of knowledge in relation to Leadership Theory and Ecological Sustainability of Outdoor Adventure Activities, as it was mentioned as a sub-text within a response. By way of example, when Maddy was answering QB1, she stated that they would "teach the aspects of the theory, and how that fits into Outdoor Leadership, and the premise of it."

1k. Assessment Techniques - Discusses a range of assessment techniques that are for, of and as learning in relation to summative and formative assessment. Throughout their discussion, three teachers commented about a wide range of assessment techniques. Across four scenarios, teachers mostly discussed assessment techniques when assisting with a student mistake (QA2) and LNT (QD1) by providing seven examples. The responses, mostly unprompted (5/7), were both formative and summative assessment techniques that were related to the assessment of, for and as learning. Five responses were in relation to the assessment of learning ("when teachers use

evidence of student learning to make judgements on student achievement against goals and standards" (Victoria State Government, 2016)), whereby two were for learning (**"**when teachers use inferences about student progress to inform their teaching" (Victoria State Government, 2016)). Four responses were formative assessment techniques ("The goal of formative assessment is to gather feedback that can be used by the instructor and the students to guide improvements in the ongoing teaching and learning context (Carnegine Mellon University, n.d.)), and three were summative ("The goal of summative assessment is to measure the level of success or proficiency that has been obtained at the end of an instructional unit" (Carnegine Mellon University, n.d.)).

The range of assessment techniques included: discussion (2), peer assessment (1), essay responses (1), assessment design (1), leading formative questions, and observational assessment techniques (1). Some evidence is also shown in 1a (Teaching Strategies) and 3a (Assessment Approaches), as the teachers' discussion highlighted some complexities of assessment and adjusting assessment techniques to topics in the curriculum. By way of example, Hamish stated:

> It is easy when you are doing navigation and you have to get from point A to point B, and the students can do that, you have got a tick, there is my evidence. With something as intangible as sense of place, it can be more difficult. Conversations with students would be one of those ways.

Content Knowledge in a Pedagogical Context

2a. Profound Understanding of Fundamental Outdoor Education Curriculum - Exhibits deep and thorough conceptual understanding of identified aspects of the Outdoor Education Curriculum. When being interviewed about the course, three teachers showed deep understanding about topics within the Outdoor Education Curriculum. There were six examples across four

scenarios of this knowledge, which were mostly prompted throughout the interview. The two curriculum topics described were related to Leadership Theory and Human/Nature Relationships, with an emphasis on deep conceptual understandings of sense of place and space.

The knowledge described related to human relationships with nature (3), Situational Leadership theory (2), and how values and attitudes towards the environment have changed over time (1) (TQA, 2013). The depth of their discussion mostly related to an understanding of spiritual and human connections to land. By way of example, Maddy described the change in human values toward the environment over the past 200 years and also identified the different values that students would have for other environments around Tasmania. Although this deep conceptual knowledge was discussed, teachers were also able to deeply deconstruct topics within the curriculum.

2b. Deconstructing Content to Key Components - Identifies critical Outdoor Education components within a concept that is fundamental for understanding and applying that concept. When asked to discuss their teaching of Outdoor Leadership, all teachers were able to deconstruct topics within the curriculum. There were 24 examples of topics that were deconstructed throughout seven different scenarios. Teachers' responses were mostly prompted as they showed this knowledge. The topics discussed included curriculum topics: Planning for Outdoor Activities, Leadership Theory, Group Management, and Human/Nature Relationships. Most of the responses came from QB1.

Specifically, teachers discussed Situational Leadership theory (8), sense of place and space (6), LNT principles (5), conflict resolution (5), map and compass (3), group management (2), deep critical reflection (1), and human's different values and attitudes towards the environments (1). By

way of example, when Kyle was discussing the role of effective communication, he stated they would have:

> Run-through the background of communication. So look at the type of communication and barriers to communication…And then you talk about what is important. Why you need effective communication, and then start to link that into some of the group dynamics and how a group comes together …cover things to do with lack of communication, however it functions, …leader without the communication between the participants themselves as well as the leader.

This knowledge category closely ties with Profound understanding of key components. However, there was more evidence of topic deconstruction as teachers identified critical aspects of a topic.

2c. Outdoor Education Structure and Connections - Makes connections between concepts and topics, including interdependence of concepts. Throughout their discussion of the Outdoor Leadership curriculum, six teachers provided 13 examples of connections and structure with the curriculum. After mostly being prompted about a topic, teachers showed this knowledge in seven scenarios. They were able to draw connections between curriculum topics, outcomes and time spent on certain topics, due to the influence of external assessment. For example, Gilbert stated "there's tons of theory in the course, and yeah, the external assessment for good or for bad does direct you in certain ways."

Teachers showed connections between the following topics: sense of place and space (4) map and compass (3), LNT Principles (2), Situational Leadership theory (2), role of effective communication in group management (1), and general curriculum knowledge (1). Notably, the

main point of discussion came from teachers drawing connections between human and nature relationships. They often discussed the ways that humans have connected to the land. By way of example, Geoff highlighted the connections from visiting a park to the curriculum by stating:

> I align their experience, the experience of this girl for example, and her peers, when they have been to Mount Field twice, they have looked at the experience of somebody revisiting a very natural area, national park, old heritage area. And so they have developed a strong relationship with this place, two visits in particularly attractive times. And so, in terms of Peter Martin's signposts, and the stuff that he articulates in the articles he has written, which is accepted as one of the texts that students read.

2d. Procedural Knowledge - Displays skills for solving Outdoor Education problems (conceptual understanding need not be evident). In one scenario, when discussing their teaching of Outdoor Leadership, all teachers provided a procedure to assist a student with a technical error. In response to QA2 about assisting with a student's map and compass error, the teachers each provided a similar effective procedure to help the student struggling with the navigation error. The teachers either provided similar memorable phrases (Cooper - "deviation east compass least, deviation west compass best") or acronyms (Hamish - "grid to magnetic is GM, and GM car is a bad car, as opposed to an MG, magnetic to grid, and MG is a good car") to help the student remember the procedure. Although the phrases and acronyms were similar, the same (2d) Procedural Knowledge about the skill was evident from all teachers.

2e Methods of Solution - Demonstrates a method for solving an Outdoor Education problem (i.e. Conflict Resolution or Judgement). When discussing teaching topics of Outdoor Leadership, all teachers provided a range of methods of solution to issues. There were 11 examples

of solutions presented from four scenarios. Most of the responses (6) were in relation to facilitating deeper reflection (QB2), yet three teachers also showed solutions related to map and compass (1, QA2), conflict resolution (1, QC2), and the teaching of Leave No Trace (1, QD2).

When answering QB2, teachers would use a range of strategies to facilitate deeper reflection which included: using guided questions (4), visual metaphors (3), group discussion (2), nature interpretation activities (1), sit spots (1), writing (1), and voice-recording (1).

Upon further discussion, teachers discussed the following solutions to issues presented. QA2 Map and Compass – Trial and error (1), student leadership role (1), QC2 Group management: switching partners (1), and QD1 LNT - campsite audits (1). By way of example, when Gilbert was discussing facilitating reflection, he stated:

> I could do some other things like, we could ditch the pens and paper and we could have a session where they need to find bits and pieces from the environment to tell a bit of a story about how they are feeling about a certain question or a part of a trip or something like that.

A majority of these solutions are also evidence of teaching strategies. It does however show a range of techniques that teachers are using to solve issues presented to them.

Pedagogical Knowledge in a Content Context

3a. Assessment Approaches - Discusses or designs tasks, activities, or interactions that assess learning outcomes. Throughout the interviews, all teachers discussed a range of assessment approaches across nine scenarios, following the suggestion of a topic or scenario. Their responses were in relation to sense of place and space, map and compass, Situational Leadership theory, LNT, and the role of effective communication in group management. Their responses were mostly

evidence of approaches to hard skills (QA2) and deep critical reflection (QB2). The teachers expressed a range of assessment approaches including: guided discussion (11), direct observation (5), assessment task writing (1), reflective writing (5), essays (1), questioning of content (2), pre-testing (1), research style assessment (1), peer teaching (1), peer assessment (1), and peer coaching (1).

Teachers would also imbed a range of assessment approaches to focus on learning outcomes. By way of example Hamish stated, “So we do things like, a journal entry could be taking a photograph and then, "Let's talk about this photograph. What does this photograph tell you about you as a person?" The identified range of assessment approaches shows the breadth and fluidity of assessment approaches that these teachers have.

3b. Goals for Learning - Describes a goal for students’ learning. When asked to discuss their teaching of Outdoor Leadership, four teachers clearly described goals for students’ learning across three scenarios. There were five examples of goals that were discussed, as responses were mostly prompted. Two responses came from a scenario relating to deep critical reflection (QB1), two were related to the role of effective communication in group management (QC1), and finally one related to sense of place and space (QE2B).

All goals were related to student learning and outcomes, more so a focus on deeper critical reflection (2), understanding of effective communication (2), and understanding the different historical values individuals have for places. The goals were mostly identified to students in discussions during debrief or as an introduction. By way of example, Jarrell stated:

> I would probably start with a little bit of a chat explaining what sort of things we are looking at and looking for in their reflection. Explain that we want some more emotional responses rather than facts of what they have been doing, how it made them feel.

3c. Getting and Maintaining Student Focus - Discusses or uses strategies for engaging students. As the participants were discussing their teaching practices, five teachers expressed specific strategies for engaging students. There were six examples of maintaining student focus discussed, where five of the examples were in relation to a conflict resolution scenario (QC2), and the other was related to a location for debriefing (QE1). The strategies for getting students to focus showed that teachers used a range of techniques that were appropriate to the situation and their knowledge of the students.

The strategies identified were direct (power and dominance) and in-direct (debriefing outside) approaches. The strategies identified were categorised into power and dominance (3), a quiet word in a student's ear (2), compromise (1), and a class discussion outside on campus (1). By way of example, Cooper stated "If Thomas wasn't the sort of guy who is going listen, then we might use a different strategy. So, maybe compromise, maybe power and dominance, if he is the sort of guy who responds to power and dominance then I might just use power and dominance."

3d. Classroom Techniques - Discusses or uses generic classroom practices. When discussing their teaching practices, three teachers identified a range of classroom techniques. In the context of this thesis, and Outdoor Education, classroom practices includes 'out-of-classroom' learning spaces (e.g. field-trips, classes outside on campus and expedition style trips). There were six examples of classroom techniques discussed from four scenarios. The topics discussed related

to map and compass (2), sense of place and space (2), Situational Leadership theory (1), and conflict resolution (1).

The techniques described included inside classroom practices (sit and discuss) and out-of-classroom techniques (debriefing around a fire). The techniques described were inside; pre-testing (1), post-field discussion in a classroom (1), and inside the classroom learning (1). The outside techniques included: debriefing/ (1), solo thinking time outside (1), out-of-classroom teaching (1), and student grouping (1). By way of example, Jarrell stated:

> Reflecting on the activity afterwards, often what I'll do in practice is after we've come back from a trip and the students have had a couple of days to digest it, usually our next lesson the following week or whatever, sit down in a group, we break up the typical classroom layout and sit down in a circle and have a bit of a chat about the experience that they've had and try and draw out these responses in students to explain.

Chapter Summary

This chapter has highlighted the results from the data analysis. It has shown the specific examples of each PCK category and identified examples from each. The following chapter, Discussion, will further articulate the results and draw upon literature to show the findings of this thesis.

Chapter 5 - Discussion

Chapter Overview

The aim of this research was to inquire into the PCK of OE teachers. The results from the previous chapter showed evidence of the different PCK categories that teachers have shown from their discussion. This chapter will focus on the trends from the results and discuss the evidence in an effort to answer the research questions. This chapter is presented in two parts, the first will answer research question one and discuss the themes in PCK, the second part will answer research question two by discussing the suitability and adaptations that can be made to the framework.

Research Question 1

Clearly PCK

The key aim of research question one was to identify aspects of PCK that are evident in OE teachers' discussion of their practice.

Teaching Strategies. Teachers in this study showed a plethora of teaching strategies to teach Outdoor Education. A key finding in this research is that teachers are utilising knowledge from each of the categories identified in the framework as part of the teaching process. Within their teaching strategies, teachers were able to draw knowledge from categories in the 'Clearly PCK' section of the Framework. Notably, the strongest relation was found between Knowledge of Examples (1g) and Teaching Strategies (1a), whereby teachers utilised their knowledge of local, fictional, and realistic examples to teach topics.

Not surprisingly, teachers in this study have drawn upon different categories of knowledge in the PCK Framework for their teaching. By way of example, when Jarrell was discussing

Situational Leadership theory, he drew upon his knowledge of examples as a teaching strategy by stating:

> …if we are using mountaineering as an example, we have got our high task focus, so you end up having an authoritarian sort of approach towards your leadership style. Whereas, if you're doing something like a gentle float down a river, we might talk a little a bit about the fact that it might be more relationship orientated, so you're trying to get people talking and chatting. So you'll lead a more potentially abdicratic (joining or delegating, (Priest & Gass, 2005, p.244) style of leadership. So we just give some examples like that to highlight how kids, or how they might choose their leadership styles using that model. (Jarrell)

Within this statement, Jarrell has drawn content knowledge from differing bodies of OE knowledge, as reflected by Martin (2008). As discussed in Chapter 2, Martin's bodies of knowledge represent key areas of content knowledge that Outdoor Educators possess. The bodies of knowledge that Jarrell draws content from are "outdoor leadership, outdoor pursuits, and journeys or expeditions" (2008). Jarrell's ability to adapt this content knowledge to suit the needs of the learners distinctively reflects Shulman's (1987) definition of PCK, with the transformation and blending of content and pedagogical knowledge. This transformation of content knowledge into forms that are suitable to the students' needs is continuously exemplified by the responses from participants in this study. Although this relationship between knowledge of examples and teaching strategies is significant to the teaching process, the relationship and understanding of Student Thinking (1b) plays a major role in teaching.

Student Thinking influencing Teaching Strategies. Teachers have shown that their knowledge of student thinking influences their teaching strategies. The importance of knowing

students and differentiating to their learning needs is a topic discussed throughout literature and includes topics about qualities of effective teaching (Stronge, 2007), techniques for differentiation (Regional Educational Laboratory Mid.-Atlantic & International I.C.F., 2015) and frameworks of quality teaching (NSW Department of Education and Training, 2008). A relation among the literature on this topic discusses the importance of developing trusting relationships with students and the effectiveness of knowing about students' learning needs, personalities and ways to support them. By understanding the ways that students think, teachers have adapted their Teaching Strategies (1a) and Assessment Techniques (1k) to their students. By way of example, when Hamish was discussing facilitating deeper reflection, he showed this knowledge by stating:

> So we do informal and formal debriefing sessions, depends on the students and their readiness. Sometimes formal debriefing sessions can feel really forced, so if I get the feeling that the students aren't up for it, then we just don't do it.

While Hamish discussed this in relation to Assessment Techniques (1k), Maddy highlighted another type of knowledge of Student Thinking (1b) in relation to students' suitability to the course and level of understanding. Upon discussion, without being prompted, she stated, "we don't feel that at Year 11 they're at a stage that they can actually lead. And have the confidence to do that."

It is clear from this data that the intimate knowledge of Student Thinking (1b) influences Teaching Strategies (1a). This knowledge is a key component to the student-teacher relationship and is expressed by Shulman (1987) as 'Knowledge of learners and their characteristics'. Evidence from Shulman shows that knowledge of Student Thinking (1b) is vital to the teaching process.

Furthermore, Shulman highlights that Curriculum Knowledge (1k) is a category of teacher knowledge, which is well represented in results.

Curriculum Knowledge. Curriculum knowledge is defined by Behar and George (1994, p. 48) as the "ability to apply theoretical principles, and behaviours associated with planning, implementing, and evaluating the curriculum, in differentiating instruction, and in enhancing the capacity of responsiveness to the social context and dynamics of student classroom milieu." It is essentially the capacity of a teacher to utilise the materials and techniques that are the 'tools of that trade' of a curriculum (Shulman, 1987). This definition highlights the notion of differentiating curriculum content to students, however it more so relates to the embedded knowledge of a curriculum and understanding the ways that a teacher uses curriculum knowledge to teach.

Curriculum Knowledge (1k) was demonstrated by five teachers as evidence of PCK. They discussed how topics within the curriculum were taught, the influences of external assessment, and the time given to each topic. As Maddy was talking about navigation she stated it is "not externally assessed. So, to be honest with you we don't spend a lot of time on it." In contrast, Geoff stated that his thoughts with navigation were that it is "only a small part of the overall planning and organising sort of section of the learning outcome. So, typically I've done some orienteering, I think works quite well too."

In this Clearly PCK section, there is evidence that OE teachers have been using differing Teaching Strategies (1a) for their class based on their knowledge of Student Thinking (1b) by using their Knowledge of Examples (1e), Resources (1h), or Explanations (1f) as they teach. These knowledge bases represent a range of components that are conceptualised in PCK definitions (Jing-Jing, 2014). Jing-Jing's (2014) paper articulates the progression of conceptualised PCK definitions

by summarising the components that authors Grossman (1990), Gudmundsdottir and Shulman (1987), Magnusson, Krajcik & Borko (1999), Shulman (1987), and Tamir (1988) have written. A key finding in this paper, which relates to the drawing together of different knowledge bases for teaching strategies, was that all the authors include using a range "Instructional strategies for teaching the subject matter." This therefore supports that OE teachers are representing key components of PCK by having a wide range of teaching strategies that are influenced by student thinking.

Content Knowledge in a Pedagogical Context

Content Knowledge. The knowledge that was shown in this section showed that OE teachers have deep content knowledge about the connections within the curriculum, an ability to deconstruct topics suitable for teaching, and support students by showing (2e) Methods to Solutions and (2d) Procedural Knowledge. This section of the framework truly highlighted the content knowledge that teachers showed and ways that they would use this knowledge to teach. The following will depict the ways that the participants drew content knowledge and the relationships among them for teaching.

Deconstruct Concepts and Topics. The most common and influential piece of evidence in this section was shown by teachers' abilities to deeply deconstruct concepts and topics into ways that were suitable to the needs of their students. A teacher's ability to deconstruct concepts and topics for a diverse classroom is a primary responsibility of teachers, as their content knowledge is the primary resource for student learning (Shulman, 1987, p. 9). The teachers deconstructed concepts in all topic areas, however most of the responses were related to Leadership Theory (Topic B). When discussing Situational Leadership, teachers showed how this theory relates to other theories and leadership styles by highlighting characteristics of similar theories. By way of

example, when Maddy was discussing Situational Leadership theories, she showed how aspects of the theory related to other styles by stating:

> So I do tend to simplify and use the autocratic, democratic, abdicratic, because that fits into several theories of that style of leadership within that theory. So, situational, I would take situational as just one theory within quite a few theories.

Gilbert also showed some external influences on how he would teach Situational Leadership by saying "In terms of the leadership theories, the Situational Leadership theory, I would talk about the task and the relationship and the safety orientation and the demands of the situation."

Kyle deconstructed his knowledge of Leadership Theories by saying he would:

> Start off with all the terms, defining the terms, to do with telling, selling, participating, and delegating and seeing how it fits in with other theories that we might have already looked at, like the style theory and so on. How that's sort of similar where the different styles fit in with the different telling, selling, participating, and delegating. And then, probably spend a lesson looking at that and comparing it with other theories and like I said, using the terms and then looking at the theory itself.

Sense of place and space. The other concept that was commonly deconstructed was sense of place and space, in Human/Nature Relationships (Topic E). Teachers showed an ability to deconstruct the complexity of how humans relate to nature, the different signposts to nature (Martin, 2004) and ways of developing students' understanding of their relationship with nature.

Maddy deconstructed ways of understanding sense of place and space by also using an example her students could relate to:

> And so that idea of a relationship with place likening it first to a relationship with a person and so any relationship has to be reciprocal in that. And there's a give and take and there's a familiarity. So I can't say I know you if I've only spent five minutes with you. Just like I can't say I know Mount Wellington if I've only been there once for a brief five minutes. So, you're not gonna develop that sense of place unless you have a relationship. So trying to sort of unpack what that means in not a tree hugging kind of way but just that it's spending time. And so I usually start with getting them to tell me where's a place that they actually feel something.

In contrast, Kyle deconstructed ways of talking about sense of place as a 'whole' and deconstructed historical representations of places, by questioning:

> We talk a bit about, with the sense of place, being able to really understand it and know an area, sort of as a whole. So you know, understand the whole. So when we figure other areas, if we are talking about place and space and so on, we'll have a look at the place from several angles. So looking at it, who's used this place before, so looking at starting with indigenous cultures and looking at then why did we come here and why are we using it, are we using it for the same reasons, or are we using it for different reasons and how out of respect, how they used to use it and that sort of thing. That's probably the biggest way I've found that I've tried to teach that. It's just like when you go somewhere is it's not just going there and looking at what's there now, but always trying to look at what has been there, what's there now and then even talking about our future, future uses for that area.

As shown by these teachers, they have an ability to deeply deconstruct complex topics and ideas to students. Within this knowledge, OE teachers have also presented knowledge about the connections within this Outdoor Leadership curriculum. This transference and understanding of the curriculum allows the teachers to draw and plan their teaching. This planning aspect, in relation to Hashweh's (2005) articulation of PCK, is imperative to the process of developing teacher pedagogical constructions.

Outdoor Education Curriculum. The teachers drew connections between curriculum topics, course structure, curriculum outcomes, and showed how learning from the course can be transferred to student's lives outside of school.

Kyle clearly represented how LNT principles can be transferred to the everyday lives of students and make concepts that are taught in class, outside habits. He stated:

> I find, students often think the wilderness and areas, they really are quite focused on the Leave No Trace principles, and picking up rubbish and not damaging the environment there. Then they go home and you will see them in the school yard tossing a packet of chips on the ground or something, it is like, "Well how is that any different? Yes, it is not a natural environment, but it is still your environment where you have to live." I try and relate the two, I guess, like civilised life to being in the outdoors.

Teachers were also able to draw connection in the curriculum from Leadership Theories (Topic B) and highlight how aspects of the Situational Leadership Theory are useful to know for understanding and applying the Conditional Outdoor Leadership Theory (COLT (Martin, et. al., 2006)). Gilbert expresses these connections in the curriculum by stating:

> Well, the leadership theories are many and varied, and in terms of Situational Leadership theory, that's quite a good one because it leads nicely into some other contemporary theories without specifically focusing on Outdoor Ed. So, I would predominantly teach that in a theoretical sort of classroom style scenario. I would focus on that one and use it as a launching pad for them to understand the conditional outdoor leadership theory, which follows on quite well, and if they can understand the Situational Leadership theory, they'll be on track to have a good understanding of the COLT, the COLT theory.

Teachers also discussed the structure and ways that they imbed and teach the curriculum, which is clear evidence of showing their curriculum knowledge (Behar & George, 1994). When discussing navigation Hamish stated, “I probably wouldn't have a topic on its own of navigation. It would be sort of a subtopic within a unit of work” as a way of structuring concepts when teaching Outdoor Leadership.

The way that teachers are engaging and using their content knowledge is also shown through their knowledge of (2e) Methods of Solution and (2d) Procedural Knowledge to tasks. When answering QA2, about supporting a student with a technical navigational error, all teachers gave a similar response and showed a (2d) Procedural Knowledge to support the student. Therefore, showing another example of the deep content knowledge that these teachers have about topics within the curriculum.

Methods of Solution. When teaching OE, there are often a number of factors that affect the (2e) Methods of Solutions to problems that teachers can use. In this context it relates to reflection and journaling. A body of literature exists that shows some ways that leaders can design solutions to manage risks (Dickson & Gray, 2012; Hayllar, Gray, & Dickson, 2005; Priest & Gass,

2005), adapt leadership styles (Priest & Gass, 2005), and support reflection (O'Connell & Dyment, 2013). To compare two (of many) reflection strategies, teachers may choose to facilitate reflection with creative journals by writing poems, postcards, or mapping their thoughts (O'Connell & Dyment, 2013, pp. 111-113) or may also choose to utilise technology to write blogs, websites, or contribute to online discussion groups (Dyment, O'Connell, & Boyle, 2013; O'Connell & Dyment, 2013, pp. 147-149). The participants in this study have provided a range of methods for facilitating debriefs and supporting student's critical reflection. Each teacher showed ways of facilitating critical reflection including: questions around the campfire, using student's journals as reflective tools, talking to a voice recorder, writing blogs, and using nature as a tool to tell a story. Gilbert highlighted a creative way of debriefing experiences to support his students by stating:

> I could do some other things like, we could ditch the pens and paper and we could have a session where they need to find bits and pieces from the environment to tell a bit of a story about how they're feeling about a certain question or a part of a trip or something like that.

In all these examples, there is evidence that teachers have a deep understanding of how to present complex topics to students by deconstructing the concepts, using appropriate language, and examples. This depth of content knowledge and ability to deconstruct topics is imperative to PCK (Shulman, 1987) and shown in the literature as a vital knowledge base for quality teaching and learning (Boyes, 2004; McMartin, 2007; Shulman, 1987; Veal & MaKinster, 1999). Clearly, this data is showing that OE teachers have this deep, passionate and intimate knowledge about their subject and an ability to transform their knowledge into pedagogical approaches that suit the needs of their students (Shulman, 1987).

Pedagogical Knowledge in a Content Context

Pedagogical Knowledge relates to a teacher's abilities to transcend their content knowledge into forms that are powerful, with teaching occurring in class and in the field (on excursion, out of class activities, and expeditions). Within this curriculum, teachers have been able to express a range of flexible assessment approaches that have been adapted to suit the needs of students when being assessed on learning outcomes. Through this pedagogical knowledge, the teachers have also clearly identified goals for student learning and a range of classroom techniques and methods of getting and maintaining students' focus. Predominately, teachers have expressed creative and differentiated assessment approaches.

Flexible Assessment Approaches. Assessment approaches include the range of tasks, activities, or interactions that teachers utilise to assess learning outcomes. The importance of diverse assessment techniques and strategies is a topic often discussed in the educational literature (Chapman & King, 2012). The literature focuses on assessing students with both formal and summative techniques that are suitable to their needs. These teachers have shown a depth of assessment approaches that suit the content and needs of the students as they were being assessed on their abilities to critically reflect and articulate their relationships with nature. Some of the assessment approaches that are expressed include "peer teaching, peer assessment, and peer coaching" (Hamish).

By teachers knowing and understanding their students, they are able to differentiate their assessment approaches. Maddy showed this flexibility to adapt approaches when discussing critical reflection by stating "I've taught boys who are very creative and artistic, and so in order to reflect it could start with, drawing, or creating, something." The design of these assessment tasks is not a simple undertaking and is influenced by the teachers' knowledge of curriculum, students,

and content (Chapman & King, 2012). The adaptability of designing these assessment approaches is identified by Cooper during his discussion of aligning students' experience in nature to the learning outcomes of the course, by stating:

> When I'm writing an assessment task, or I'm writing resource materials, I look at the standards, the different objectives within the subject, and the standards that match up to those objectives, and see that my students could do them. [I would check] that the task suitably matches up to those standards, so I can articulate, or measure, whether they are achieving the different standards. So, I might use my own assessment, or I might use peer assessment, or I might get them to self-assess, or it might be a mixture of the two, but they would be looking to see whether their reflection on their experience of their human-nature relationships, matches up to their understanding, or what they're expected to understand from the curriculum.

As Kyle is assessing critical reflection, he further exemplifies this flexibility of assessment approaches as he aims to:

> Tailor the questions so as they are specific to each student. So leave them quite broad, the questions, so they can talk about their own experience and how that has helped them to develop their own appreciation of the area and how that has helped them.

These teachers are showing a range of assessment approaches and techniques that are ways of differentiating their approaches. This is a key skill of a quality teacher to be able to design assessment approaches that challenge the students in creative ways (Chapman & King, 2012). This form of pedagogical knowledge identifies how teachers adapt their content knowledge in appropriate ways to their students (Shulman, 1987). Another way that teachers have shown their

pedagogical knowledge is by setting goals with students, which supports strategic assessment approaches that can be used.

Goals for Learning. Setting goals for learning is a strategic way that teachers set expectations to their students to pre-load them with information for their own learning. This relates to "Directly frontloading the experience" which is one of the Six Generations of Facilitation, that was articulated by Priest and Gass (1997). This method of frontloading an experience and 'setting the tone' for students is a common strategy to direct students' learning and expectations for what is to follow.

OE teachers have an ability to present diverse goals to their students. They do this by setting goals prior to a topic and setting a theme/intention for the days in the field. A prime example of using goals as a way of "setting the scene" was shown by Hamish when he stated "We also try at the start of every camp that we do, we try to set targets." This simple method of setting goals for experiences allows students to focus particularly on the concept presented. Further this shows the intention that OE teachers place with their teaching and engaging with students.

Getting and Maintaining Student Focus. This pedagogical technique was demonstrated by some of the teachers to gain and maintain the attention of their students both in and out of the classroom. The teachers expressed that they would adapt their methods of getting students' attention according to their knowledge of the situation. Two key pieces of literature that relate to this knowledge base were presented by Stronge (2007): Classroom Management Techniques (p. 39-51, 2007) and the Role of Caring (p. 23, 2007). The Role of Caring is developing a caring relationship with students as an effective method of teaching.

The differences and ways that participants maintain student focus was discussed. Hamish suggested using a calm approach to gain student attention. He said: "Sometimes, it depends on the nature of the student, but sometimes students react quite well if you ask them nicely." Geoff also showed an alternative way to gather student attention efficiently was "to use the power and dominance to just... Just to separate them and deal with it quickly." Teachers also expressed using outside spaces on campus as a place for discussion with their class (Cooper). This flexibility of student management approaches relates to Blenkinsop et al. (2016) 'managing rhythm' skill, as previously discussed.

From the discussion above it is clear that OE teachers' have PCK knowledge. This section has identified the differential and adaptable approaches of using a range of pedagogical approaches to teach Outdoor Education. Teachers have shown the ability to manage an ever-changing environment and to blend lessons with a "learner-centered approach" (Thomas, 2015) in both the outdoor and in-classroom learning environments (Blenkinsop et al., 2016). Correspondingly, they have demonstrated knowledge from the bodies of knowledge that Martin (2008) highlighted, emphasising the "journeys or expeditions, place-based knowledge and human/nature relationships" bodies. Further, the way that these teachers have continued to blend their knowledge from different PCK categories into the teaching process shows the depth and consideration of teaching.

Research Question Two

Research question two focused on the PCK Framework and questions the effectiveness and suitability of it to analyse PCK in OE teachers. The question was:

2. What aspects of the amended PCK framework are useful for analysing OE teachers' PCK and what adjustments of this framework can be made that will be effective for future PCK research in OE?

The framework was modified from a mathematics context and therefore suited to mathematics teaching. The following will focus on ways that the PCK Framework (Table 1) was effective for analysing PCK and will then identify potential future changes to the framework for further research.

Effectiveness of Framework

The framework was effective in identifying specific knowledge categories from the data and allowed the researcher to see the strengths and weaknesses of the participants' PCK. A recurring theme was the complexity of the teaching process and the ways that participants would draw knowledge from different categories as a part of the teaching process. This framework simplified the researchers understanding of PCK with the range of different knowledge categories (e.g. Clearly PCK).

Interview and PCK Framework. The interview schedule combined with the PCK Framework drew evidence of all the PCK categories. The interview schedule allowed for a breadth and depth of teaching knowledge to be expressed, with questions specifically being designed to draw different categories of PCK. It showed that all categories of PCK were present in OE teachers' discussion of their intended practice. The PCK Framework also allowed clear evidence of knowledge to be identified to further understand how the knowledge categories are blended as a part of the teaching process. Each participant showed clear areas of strength and weaknesses as they provided more data in certain areas of the PCK Framework.

Areas of PCK Strength or Weakness. The PCK Framework was also effective in analysing each participant's strengths and weaknesses. Through this, the researcher was able to summarise and understand to a greater depth the influences and knowledge of each participant. This strongly ties in with the notion that PCK helps to decipher expert from inexpert teachers (Bullough, 2001), and it can be a basis to support professional development. By way of example, Hamish's discussion highlighted how his teaching and assessment is very influenced by his knowledge of students and their needs. Whereas, Kyle's discussion implied a deep knowledge of local environments and understanding of content.

Overall, the PCK Framework was effective as a tool to identify the different knowledge categories and highlight evidence of PCK. It allowed the researcher to have a thorough understanding of teachers' discussion of their PCK and understand where teachers draw their knowledge from as a part of the teaching process.

Future Changes for the Framework for Outdoor Education

Additions to PCK Framework. In the process of analysing the data, there were clear changes that could be made to make the PCK Framework suitable for OE. Table 2 below shows the additions to the PCK Framework that would be made.

Table 2 - Additions to PCK Framework

Content Knowledge in a Pedagogical Context	
Knowledge of Place	Deep Knowledge of a location including the geographical, human, and cultural knowledge that is specific to a place.
Pedagogical Knowledge in a Content Context	
Facilitation Techniques	Discusses or uses knowledge of facilitation techniques to support learning through an experience.
Group Management Techniques	Discusses Group Management techniques to manage a group and individuals on an experience.

Three knowledge categories can be added to the PCK Framework that would be suitable for OE. These include: Knowledge of Place (Content Knowledge in a Pedagogical Context), Facilitation Techniques, and Group Management (Pedagogical Knowledge in a Content Context).

Knowledge of Place. Place is defined as both the imaginative and physical reality of a location and its people, and how the two interact and change each other (Wattchow & Brown, 2011, p. 1). It is also defined as the way "humans live, experience and relate to particular locations on the Earth's surface" (2011, p. 51). This knowledge base represents the deep intrinsic knowledge that teachers have about places including the knowledge of weather patterns, human history, cultural values, ways people connect to a place, geographical knowledge (geology, flora and fauna), 'local knowledge,' and land management of a specific location.

Knowledge of places and place-based relations are contemporary themes in recent OE literature. It relates to the 'concern about cumulative effects of modernity' due to modern methods

of travel and the care and response to 'home' and remote visited places (Wattchow & Brown, 2011, p. 51). The literature on place relations is extensive, as authors support the importance of developing relationships with 'place' (Atencio et al., 2014; Brown, 2008, 2011; Brown, 2008; Hill, 2008). Although there is concern for 'place,' this knowledge area has been added based on the evidence from all participants' knowledge of specific places and the ways that they would use this knowledge to support their teaching practices. It also draws close ties with Topic E of the Outdoor Leadership Curriculum (TQA, 2013), Human-Nature Relationships, as it inquiries into contemporary and historical representations of place.

Facilitation Techniques. Facilitation is the 'process of moving a group or individual toward a desired outcome' using a variety of techniques (Martin, et. al., 2006, p. 106). Facilitation is supported through a variety of styles (nondirective, appreciative, activity, group, and directive) and techniques that can transfer the learning from an experience to new understandings (2006, p. 106). This knowledge differs from teaching strategies, as "In facilitation the goal is usually for people to learn something that nobody knows at the beginning, whereas in teaching the goal is for people to learn what the teacher already knows" (Greenway, 2004). This has been added as participants spoke about different facilitation styles that they would use to guide student learning. By way of example, Gilbert mentioned that he would "debrief afterwards and then little bits and pieces throughout the day to help them facilitate the different experiences," as he discussed facilitating student learning for curriculum outcomes. It is also a very common and important practice in outdoor educational experiences for teachers to facilitate the learning using different styles. This is reflected in the literature by Gagnon and Bumpus (2016); Hayllar et al. (2005); Martin et al. (2006); and Thomas (2005, 2010).

Group Management Techniques. This knowledge relates to group development, dynamics and supporting groups through an experience. It includes the knowledge of students and techniques that teachers use to support students. A key aspect of this knowledge is in a teachers' ability to understand the stages of group development (forming, storming, norming, performing and adjourning) (Martin et al., 2006, pp. 138-139) and the corresponding six dimensions of group development and dynamics (1. Individual & Personality, 2. Group Process and Structure, 3. Group Functions and Tasks, 4. Leadership and Power, 5. Environmental, and 6. Group Impact on the individual) (McAvoy, Mitten, Stringer, Steckart, & Sproles, 1996). These pieces of literature support the development of individuals in a group and the process in which groups develop.

This knowledge should be added to the framework as group management techniques are a critical aspect of risk management on field experiences and in the classroom. This knowledge area was also discussed by participants during the interviews and showed a depth of knowledge about how groups and their classes work. This knowledge base would replace classroom management techniques as it focuses further on ways that a teacher will facilitate a group in outdoor environments.

Chapter Summary

This chapter presented the findings and answered the research question. It identified evidence of PCK knowledge in OE teachers' discussion of their practices and showed how teachers draw knowledge from differencing knowledge categories to deliver lessons as a part of the teaching process. Research question two was also answered by showing the effectiveness of the PCK Framework to decipher the data and helped to identify new knowledge categories that could be added to the PCK Framework for future research.

Chapter 6 - Conclusion

Chapter Overview

This chapter presents a summary of the research findings and shows how these findings can contribute to PCK research and the Outdoor Education field. A summary of the limitations of this research are then presented and followed by future research possibilities.

Summary of Findings

The aims of this research were to show evidence of PCK in OE and propose adjustments to the PCK Framework for future research. Through the process of semi-structured interviews, participants presented their PCK when discussing their intended teaching practices while teaching Outdoor Education. By doing so, they also presented their knowledge of the curriculum and the way that they teach the subject; thereby showing their strengths and weaknesses in knowledge according to the PCK Framework for Outdoor Education (Table 1).

The participants responded to common outdoor scenarios and presented their intended ways of teaching the subject. From these interviews, it was clearly evident that teachers would draw upon different knowledge categories to teach to the needs of their students'. By way of example, teachers would commonly discuss their knowledge of students (Student Thinking - 1b) and by using their deep content knowledge (2a - Profound Understanding of Fundamental Outdoor Education Curriculum) they would formulate teaching strategies (1a) and examples (Knowledge of Examples – 1g) to present to their students using different classroom techniques (Classroom Techniques – 3d). The framework was also very effective in identifying where the strengths and weaknesses in a teacher's knowledge was shown. By way of example Kyle displayed a deep content knowledge (p. 61), whereas Hamish showed how his deep knowledge of student thinking would help to differentiate his teaching strategies (p. 52).

The second research question was aimed at identifying where the PCK Framework could be adjusted and where sections could be added. From the data analysis, the researcher identified three categories that would be added to the Framework for future PCK research. These include Knowledge of Facilitation Techniques, Group Management Knowledge, and Place-Based Knowledge. These three knowledge bases could be added to the framework, as the participants often showed these types of knowledges in the interviews. The three knowledge bases cover a wide-range of knowledge and discussion points that are specific to Outdoor Educational knowledge.

Implications for the Field

Quality Teaching and Learning Conversations in OE. The implications for this research go beyond discussion of the teachers' PCK and influences the wider discussion related to quality teaching and learning in the field of OE. It also contributes to recent trends in the literature focusing on signature pedagogies (Thomas, 2015) and specific pedagogical skills that outdoor educators can offer to mainstream curricula (Blenkinsop et al., 2016). The literature review also showed little evidence of PCK research in OE, thereby this research stands to make a significant contribution to the OE field by showing evidence of PCK and supporting the discussion of quality teaching and learning. This research was also recently presented at the 7th International Outdoor Education Research Conference, whereby there were limited presentations and conversations related to quality teaching and learning in OE. Specifically, there were a small number of presentations related to pedagogical content knowledge and signature pedagogies of OE (Maher, Asfeldt & Belalcazar, 2016).

Significance of PCK Research for OE. From the literature review, it is evident that PCK research in other educational fields is important as it contributes to the discussion of quality

teaching and learning related to their field. By this, it further adds to the disciplinary understanding of the field by providing supporting evidence of quality teaching in OE. It contributes to Brookes' (2004) statement about the work that needs to be done in improving OE and supports this call of work. Overall, the significance of this research relates to Shulman's (1987) view that PCK is considered a critical component of the knowledge needed to teach.

Determine Degrees in Quality of Teaching and Learning in OE. Another key element of this researches is that the framework can help determine the knowledge strength and weakness areas of teachers and degrees of quality in teaching and learning. It can be used as a tool for professional development in OE as teachers and administration can use it as a tool to find areas of strength and weakness in teaching.

Limitations of Research

Intended curriculum. The data presented was evidence of what teachers proposed that they would do according to their responses from the interview. It is not actual evidence of what teachers do in the classroom and field. This is called the intended curriculum, which is considered what teachers intend to teach from their knowledge of the curriculum (United Nations Scientific and Cultural Organisation - International Bureau of Education, 2016).

Lack of student voice. A major limitation of this research is the lack of the student voice in determining the quality of teaching and a teacher's PCK. As students are the major focus in education, having this key data piece is vital to the research.

Honours project. As this is an Honours' thesis, this limits the scope of the research and the general ability to go into great depth is constrained. However, the project was large enough to test the framework.

Possibilities for Future Research

Multi-Modal data collection methodology. In future research, it would be advisable to incorporate a multi-modal data collection process that would include interviewing students, observing the teacher in-class and/or in the field, and collecting concept maps. This is the preferred methodology as expressed by Baxter and Lederman (1999). Using this approach would increase the validity of the data, include other types of curriculum (hidden, actual, delivered, and intended – (UNSCO – IBF, 2016)), and provide a wider approach to the data collection method. A larger scale project would include a larger sample size, in-depth individual analysis of the participants, and an in-depth data analysis process.

Concluding Remarks

PCK is evident in outdoor education teachers in Tasmania and these teachers are using their individual knowledge to deliver lessons in unique ways to their diverse student populations. PCK research in OE has the capacity to determine quality teaching and learning in Outdoor Education to support teachers and the field in ensuring ongoing quality teaching and learning.

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Appendix 1 - Recruitment Email

Quality Teaching and Learning in Outdoor Education: An Inquiry into Pedagogical Content Knowledge

Dear <name of OET member>

Are you passionate about outdoor education and would like to take part in innovative research which will help to better inform quality teaching and learning in outdoor education?

This research project aims to collate information regarding the teacher knowledge base, pedagogical content knowledge, to then analyse and compare how this knowledge base is present in Outdoor Education teaching in Tasmania. The intention is to understand how the knowledge is used in teaching and to show how this knowledge is, potentially, worthwhile for teachers to understand their own teaching. The researchers are seeking to compare the knowledge base of teachers with varying levels of experience, < 3 and + 3 years' teaching experience in a school position.

Your participation in this project would be appreciated and the researchers hope you are willing to partake. You are invited to participate in an interview in which you would be given the opportunity to discuss and show your own pedagogical content knowledge in relation to the TQA "Outdoor Leadership" Curriculum Topics. Your involvement is voluntary. Should you choose to participate your confidentiality and anonymity are ensured.

You can find further information about this research project in the attached information sheet attached.

You have the freedom to withdraw from this research project at any time without explanation up until 10st December 2015, by which time data will have been included into a research dissertation which will not be feasible to remove.

Kind regards,

Christopher Walker	Janet Dyment	Helen Chick
walkerc5@utas.edu.au	Janet.Dyment@utas.edu.au	Helen.Chick@utas.edu.au

Appendix 2 - Follow-up Email

Quality Teaching and Learning in Outdoor Education: An Inquiry into Pedagogical Content Knowledge

Dear <insert name of OET member>

Approximately one week ago you would have received an email from OET inviting your participation into our research project inquiring into the teacher knowledge base, pedagogical content knowledge, to understand how this knowledge is influential in teaching outdoor education. At this point in time we have <insert number of participants already recruited> participants recruited; however we need six participants for this study to be optimally meaningful and worthwhile.

Your participation is voluntary; however it would be greatly appreciated if you would be willing to partake in the study. You will be invited to participate in an interview discussing and showing your pedagogical content knowledge in relation to the TQA "Outdoor Leadership". The researchers feel that this is an area of outdoor education currently under researched, but with the potential to significantly increase people's understanding of outdoor education and the vast benefits it can have on students who participate.

The information sheet about the research project and consent form is again attached to this email. Your participation in this study is invaluable to the research.

Kind regards,

Christopher Walker	Janet Dyment	Helen Chick
walkerc5@utas.edu.au	Janet.Dyment@utas.edu.au	Helen.Chick@utas.edu.au

Appendix 3 - Interview Schedule

Honours Research Interview Schedule

Quality Teaching and Learning in Outdoor Education: An Inquiry into Pedagogical Content Knowledge

Ethics Approval: H15108

Student Researcher: Christopher Timothy Walker

Supervisors: Dr Janet Dyment and Dr Helen Chick

Preamble:

The following interview has been designed to draw out responses to scenarios and questions based on the Outdoor Leadership curriculum. The design of this interview may seem like a 'test' however I can assure you that it isn't! There are no 'right or wrong answers.' - I'm simply curious to your responses to these scenarios and appreciate your time for this research.

Interview Questions

The following scenarios and questions have been designed to investigate the pedagogical content knowledge (PCK) in Outdoor Education Teachers, from the five (5) topics from the TQA Outdoor Leadership curriculum.

The difference in the 'Big Picture' and 'Small Picture' questions is aimed at collecting variances in the data. The 'Big Picture' questions are based on sub-topics, within each curriculum topic, to draw out wide responses from the participants. Whereas, the 'Small Picture'

questions are based on fictitious scenarios to draw out specific responses. Each scenario and question have been designed to, hopefully, draw out the PCK of the participants.

Demographic Information Questions

1) Could you please tell me how long you've held an Outdoor Education teaching position in a school for?
2) What your Outdoor Education Training?
    - Undergraduate/Postgraduate/Cert III/IV
3) How long have you been teaching this TQA Outdoor Leadership subject for? And how much training have you had for this curriculum? How deeply, in the context of professional learning, do you feel that you know this curriculum?

PCK Questions

Topic A: Planning for Outdoor Activities

QA1 - Big Picture

Scenario:

You have a new class of 15 students, all of which have varied outdoor experience, that are in Grade 11 for Outdoor Leadership. You're starting on a new topic in Term 1 which is Navigation (map and compass).

Q) How would you teach it?

- Tell me more about that.
- What resources would you use? – Knowledge of resources

- Do you teach any other activities?

QA2 - Small Picture

Scenario:

You're taking the same class on a 6-day hike in the Walls of Jerusalem in Term 4, after teaching them map and compass in Term 1. Andrew is struggling with declination and is continuously making the common mistake of adding the declination (instead of subtracting), when going from map to land.

Q) What do you do to support him

- And how do you know if he's got it?

Topic B: Leadership Theory

QB1 - Big Picture

Scenario:

Scenario: You have a class of 23 mixed gendered students in Grade 11 & 12. You're about to start teaching Situational Leadership Theory.

Q) How would you teach this subject?

- Could you elaborate further on this?

QB2 - Small Picture

Scenario:

You're on the final day of an eight day bushwalk on the South Coast Track with a group of ten male Year 12 students. One of the requirements for the trip is for students to engage in deep critical thinking about the trip, their own thought processes and understand the ways that reflection can play a role in their own learning.

You read over the students journals and notice that they're simply writing about the food they're eating and where they have been; there is little evidence of deeper level engagement.

Q) What teaching strategies would you use to facilitate deeper reflection?

- Please elaborate on that strategy

- What other outdoor teaching strategies would you use?

Topic C: Group Management

QC1 - Big Picture

Q) How would you teach about the role of effective communication in group management to students?

- What other strategies would you use?

QC2 - Small Picture

Scenario:

Scenario. You're co-leading a group of eight mixed–gendered Grade 12 students on a sea kayaking trip in Frecycinet National Park. You've hired a local guide and the agreement was that, as the teacher, you're in-charge of behaviour management. All the students are in double sea kayaks.

Allyson is in the bow (front) of a kayak with Thomas and he is continually splashing water at another boat with his paddle. Jenette is becoming frustrated with Thomas and is yelling from her boat she wants to go to shore and go home because of Thomas.

Q) How would you engage with this group to teach them about how to deal with this conflict and conflict resolution strategies?

- Could you please elaborate?

Topic D: Ecological Sustainability in Outdoor Adventure Activities

QD1 - Big Picture

Q) How would you teach and encourage the seven principles of Leave No Trace as an educational concept within wilderness travel?

QD2 - Small Picture

Scenario:

You're on a rafting trip down the Franklin River with a class of Year 11 students. This is Sarah's first outdoor trip and you find her washing pots that are covered in food in a slow moving creek, near the river.

Q) How would you facilitate her thinking process about this practice?

- Could you please elaborate?
- Why, specifically, do you engage in this way?

Topic E: Human-Nature Relationships

QE1 - Big Picture

Your class is learning about "Sense of place and space" and how it can relate to their own relationship with nature.

Q) How would you know if your students understand this?

QE2A&B - Small Picture

Last year, you brought the current Year 12 class to Mt Field National Park on a day hike, in autumn during the "turning of the Fagus" – the students were mesmerized by the aesthetic beauty of the place! This year, you've brought the students back to the same place in July. Snow has just dumped across Tasmania the previous day and Mount Field is covered and is still safely accessible. Most of the students are playing in the snow, throwing snowballs and building snowmen. Yet, you notice a particular trance in Tracey's emotive state as she is on her own…just standing there. She hasn't been upset by peers, but is obviously in a deep reflective state about the experience in this place.

QE2A

Q) How do you facilitate the group through the varied experiences they've had?

QE2B

Q) Each student in this scenario has experienced differently. How do you facilitate the student's learning to align their experience with the curriculum outcomes of this topic?

Appendix 4 - Ethics Approval

Dear Dr Dyment

Ethics Ref: H0015108

Title: Quality Teaching and Learning in Outdoor Education: An Inquiry into Pedagogical Content Knowledge

This email is to confirm that the following amendment was approved by the Chair of the Tasmania Social Sciences Human Research Ethics Committee on 7/9/2016:

- Addition of Honours student Thomas Macqueen.
- Inclusion of a subject group of 6 to 10 Outdoor Education students from the University of Tasmania.
- Revised Initial Recruitment Email, Follow Up Email, Interview Schedule, Information Sheet, Consent Form, Unable to involve in research email.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the National Statement on Ethical Conduct in Human Research (NHMRC 2007, updated May 2015).

This email constitutes official approval. If your circumstances require a formal letter of amendment approval, please let us know.

Should you have any queries please do not hesitate to contact me.

Kind regards

Katherine

Katherine Shaw

Executive Officer, Social Sciences HREC

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